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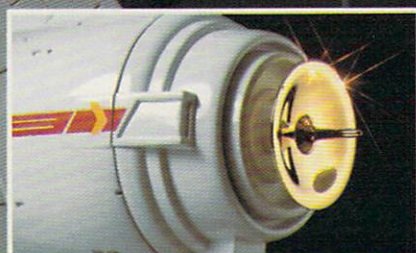


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**The 25th Anniversary Edition
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64/128 VIEW

New titles trickle into North America as the 64 continues to create interest abroad.

Tom Netsel

When was the last time you saw an ad for the 64 on television? If you live in England, you probably saw a ten-second spot tacked on the end of an Amiga ad that ran during the Christmas season.

Commodore started its important before-Christmas ad campaign in early November, pushing the Amiga, CDTV, and the 64, spending about £4.5 million on the TV spots. This marked the first time the 64 has made a television appearance in the United Kingdom since the mid-1980s.

In Germany last year, sales were the highest ever for the 64, with more than 400,000 of them making their way into German homes. Commodore claims there are more than 3 million 64s in Germany now.

It appears that not everyone has written off the plucky little 8-bitter. Too bad interest isn't as great in North America. Take the ninth annual World of Commodore in Toronto, for example. It was a lack luster show for 64/128 owners. There were no 64s on display at the huge Commodore Canada booth, and this was the first year the company didn't hire Jim Butterfield to conduct seminars.

One of the few bright spots of 64 activity came from Free Spirit Software. It announced a new series of education titles from Satchel Software in Australia. Prices weren't firm then, but the following products should be available by this time.

Picture Book lets students create stories with words and pictures. *Dr. Spellingstein* helps with spell-

ing when he's not too busy combining body parts in his lab with laser beams.

Granny's Garden is a structured adventure game for grades 1-4, and *Math Booster* allows elementary school children to improve number skills by playing an exciting arcade-style game.

Flowers of Crystal is a graphic adventure game in which players must face burning deserts, rugged mountains, and other dangerous areas with spells and magic. The teaching activities associated with the program cover most areas in an elementary school curriculum. It comes with teacher's guide, audio cassette, map, and storybook. *Dragon World* is another adventure game that provides a range of resources.

In *The Lost World*, the theme of dinosaurs provides a springboard for developing a wide range of problem-solving skills in language, math, science, social studies, and more. Another package with a theme is *Jara Tava—The Isle of Fire*. Students must cross shark-infested waters, avoid pitfalls, explore dank caverns, and try hang gliding to solve this graphic adventure game.

Creative Micro Design officials at the show were excited about a German product they plan to distribute. They didn't have samples at the show, but be on the lookout a new GEOS program called *Perfect Print LQ*. This enhancement package provides near laser quality from dot-matrix printers. It offers more than 50 fonts and is capable of 360 x 360 dpi on a 24-pin printer and 240 x 216 dpi on a 9-pin. □

GAZETTE

64/128 VIEW

G-1

New 64 software was scarce at the World of Commodore, but products from abroad are trickling in. By Tom Netsel.

FEEDBACK

G-2

Questions and comments from our readers.

AN UPDATED GUIDE TO COMMODORE USER GROUPS

G-5

Here's an update to the user group listing that we published last summer. Edited by Dana Stoll.

REVIEWS

G-10

Tony LaRussa's *Ultimate Baseball*, *Medieval Lords*, and *The Write Stuff*.

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Putting a hex on your output. By Jim Butterfield.

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GEOS tidbits, nuggets, and odds and ends. By Steve Vander Ark.

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Winners of the Design-a-Robot Contest. By Fred D'Ignazio.

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Peek the SID chip's registers. By Randy Thompson.

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Bug-Swatter	G-39

Questions and answers about disk life, different model 64s, drive belts, magnetic interference, and more

Bug-Swatter

A couple of readers noted that syntax errors occur in lines 580 and 585 of *CoilCalc* (June 1991). Author Robert Marcus offers these corrections to the program.

```
580 IN=.2*VAL(CDS)↑2*  
      (TN(GA)*VAL(CLS))↑2  
585 IN=IN/((3*VAL(CDS))+(9*VAL  
      (CLS)))  
590 IN=INT(100*IN+.5)/100
```

Disk of Ages

For how many years will data written on a disk by the 1541 drive be accessible? Some disks have lengthy warranties, but does the information stored on them eventually fade to the point of illegibility? Should you copy all your disks periodically?

DOREEN HORNE
BRISBANE, QUEENSLAND
AUSTRALIA

It's always a good idea to back up important disks, but the reason isn't degradation of the medium per se. In fact, with care, floppies can be expected to hold their data in readable form for decades. Data loss usually results from handling, when disks are exposed to magnetic fields, airborne pollutants, grime, and deformation. Since there is no way to avoid handling your disks, make backups!

Different Model

What is the difference between the Commodore 64 and 64C computers? Are all peripherals and software for the two models compatible?

MILES NOONAN
TINLEY PARK, IL

All peripherals and software which work with the 64 will work with the 64C. The reason for this is that the 64C is functionally identical to the 64 on the inside. The only noticeable differences between the two models are cosmetic.

Side by Side

When I bought a refurbished 1581 disk drive and put it next to my 1571, *GEOS* 128 2.0 would crash every time I clicked on the 1581 icon. All I could get was a *disk error* message. I tried every tip friends could offer, but nothing worked. I even sent the disk drive back to the mail-order company for repair. When I got it back, the problem persisted.

The drive sat unused for months until I decided to take it to a local technician. To my shock and surprise, when I got to his shop, there was nothing wrong with the drive, and *GEOS* worked perfectly. Why had it worked in the shop and not on my desk? The drives were separated at the shop, and they worked fine. When I took them home and put the 1581 to the left of the 1571, I had the same problem again.

I think it must be some sort of magnetic interference. When the drives are separated, they work fine. They even worked when I switched them around and put the 1581 on the right and the 1571 on the left. No more problem. Maybe this information will help others who may experience a similar problem.

JIM KVARNBERG
EDMONTON, AB
CANADA

Thanks for sharing that information, Jim. Perhaps it will help someone else.

Blue Chip Drive

I am in desperate need of a drive belt for a Blue Chip (BXD 5.25) disk drive. If any reader knows where I can acquire one or knows of anyone who repairs those drives, I would greatly appreciate being contacted.

DAVID R. STEELE
P.O. BOX 75
VERNON, MI 48476

Long Printouts

When I use *geoPaint* and print out the results, I always get a page-and-a-half printout. I have the same problem with *geoWrite* and *geoPublish*. I use a 64, a Super Graphics Jr. interface, a Panasonic KX-P1123 printer, and *GEOS*. *SpeedScript* doesn't give me this problem, only *GEOS* programs. Do you know why I keep wasting paper with these programs?

LARRY NESSRALLAH
LAVAL, PQ
CANADA

It sounds like the trouble is your printer driver. You didn't mention which driver you've placed first on your boot disk, but if you're using a driver designed for an 8- or 9-pin printer, the result will be an elongated printout just as you describe. GeoWorks recommends the NB-15 driver from your system disk for your 24-pin printer, although it will print a reduced image.

There are better drivers available for 24-pin printers. GeoWorks (2150 Shattuck Avenue, Berkeley, California 94704) has released one called LQ-1500, which is available on its Printer Driver Disk (\$10). On QuantumLink you can download a number of good printer drivers for 24-pin printers written by George Wells. His EPSON24PIN is an excellent regular driver, one called EPSON24PIN90DPI rivals laser printing for quality, and his EPSON24PIN DRAFT allows for a much faster printout at the expense of print quality. These public domain drivers are also available on BBS Post at (616) 534-1346. This BBS is in Michigan, and the sysop allows first-time callers to download programs.

By the way, while you are at it, check the DIP switches on your printer interface. These switches should be set

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Problems with spaces in BASIC, detecting modes of operation, and comments about our format

as follows: 1 off, 2 on, 3 and 4 off, 5-7 optional, 8 off.

Pen Pal Wanted

I like computers a lot. I would like to have pen friends who are interested in computers. I know BASIC and machine language. If you would like me as a pen friend, write to the following address.

XAVIER JOHN
P.O. BOX 838
BOROKO, N.C.D.
PAPUA, NEW GUINEA
(via) AUSTRALIA

XOR or X OR?

When I run *Fraction Practice II* (November 1987) on my 128, I get a syntax error in line 150. What gives?

JOHN E. POTTER
NEW LEXINGTON, OH

The program line in question reads like this.

```
150 A=FNC(Z1):IFA=XORA=Y
    THEN150
```

This is a classic example of a problem often encountered when programming in Commodore BASIC. Because the operating system doesn't strictly require spaces between commands, keywords, or variables, many programmers like to save time and space by running everything together. To a human, it's obvious that when spaces are added, the line is meant to be read as follows.

```
150 A=FNC(Z1):IF A=X OR A=Y
    THEN 150
```

The 128, however, has an XOR command. When the interpreter looks at the same line, the first part of the code presents no problem. The problem occurs when it tries to execute the IF statement. It reads it this way.

```
IF A=XOR A=Y THEN 150
```

The syntax of the XOR func-

tion is XOR(n1,n2). So the computer interpretation balks not only at the fact that there are two comparisons run together (A=XOR and A=Y) but also because the XOR function has no arguments. This is where the syntax error comes from.

Another common syntax error comes from using an AND comparison after the variable T and running the two together. The computer misinterprets the code as a TAN function. The specific solution to this problem, then, is to enter the line as a human would read it—with spaces. The way to avoid similar problems cropping up in your own code is to take the time to separate the components of a program instruction with spaces. It may save you a lot of debugging time later.

Mode Detection

I am writing a text adventure game that is supposed to work in both 128 mode and 64 mode. How can I check to see if a 128 is running in 64 or 128 mode and if it's in 40- or 80-column mode? Then, how can I make the program switch automatically to 40- or 80-column mode?

HENRY WILLIAMS
COALDALE, AB
CANADA

There's a difference between the 64 and the 128 in the way system memory is laid out. This fact can be utilized to determine which mode a program is running in. Some programmers will simply poke a value into the memory range from 16384 (\$4000) to 40959 (\$9FFF) and try to read it back. Since this is an area of free RAM in 64 mode but it's overlaid with BASIC ROM in 128 mode, the test is whether or not the value being poked can be peeked again. The following code fragment utilizes this principle.

```
10 V=PEEK(40000): POKE
    40000,V+1: PRINT 64*(V-
    PEEK(40000)+2)“MODE”
```

If you don't want to take chances with BASIC RAM memory, use the fact that the contents of the zero page vary between modes. For example, on both the 64 and the 128, addresses 768 and 769 form a vector to the BASIC error-handling routine. On the 64, the address being vectored is 58251 (\$E38B), but on the 128, the address is 19910 (\$4DC6). Peeking the address carried within this vector will tell your program what mode is being used.

To check whether your 128 is using 40- or 80-column mode, peek address 215, the active screen flag. Try this.

```
10 IF PEEK(215) AND 128 THEN
    PRINT “80-COLUMN MODE”:
    ELSE PRINT “40-COLUMN MODE”
```

To switch between 40- and 80-column screens, use the following line.

```
PRINT CHR$(27)“X”
```

Printing CHR\$(27) is like pressing the Esc key.

Format Feedback

I appreciate the present Gazette format because it gives me information about other computers and their applications. I am 70 years old, and I use a 64; my grandchildren use IBM computers.

HUGH F. SAUTTER
PERRYSBURG, OH

I am disappointed in your “replacement” magazine. Good-bye, Gazette. It was sure fun while it lasted.

DOYLE R. PAYNE
BILOXI, MS

Write to Gazette Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

AN UPDATED GUIDE TO

COMMODORE USER GROUPS

EDITED BY DANA STOLL



Last August and September, we published a two-part list of Commodore user groups across the United States, Canada, and the rest of the world. Since then, we have updated our list, adding more than 90 additional groups. Under each state heading, the groups are listed according to ZIP code.

User groups offer Commodore 64 and 128 owners a great deal of support and information. If there is a group near you, we hardly recommend that you attend a meeting and offer your support in return.

If your group was not listed last summer and it does not appear in this update, send your club name, address, and bulletin board telephone number (if available) to this address.

Commodore 64/128 User Group
COMPUTE Publications
324 W. Wendover Ave., Ste. 200
Greensboro, NC 27408

Your group will be listed in an update in a future issue.

ALABAMA

H.A.C.K.S., P.O. Box 14356, Huntsville, AL 35815 (BBS#s 205-859-9316 for 300-1200 baud, and 205-851-9827 for 1200-2400 baud)

Coosa Valley Commodore Club (C.V.C.C.), P.O. Box 1893, Gadsden, AL 35902-1893

Amiga/Commodore Club of Mobile, 3868-H Rue Maison, Mobile, AL 36608

ARIZONA

Commodore Club South, P.O. Box 324, Pinson, AZ 85126

Thunder Mountain User's Group, P.O. Box 1796, Sierra Vista, AZ 85636

Catalina Commodore Computer Club, P.O. Box 32548, Tucson, AZ 85751

ARKANSAS

Pine Bluff Users Group (PBUG), P.O. Box 1083, Pine Bluff, AR 71613 (BBS# 501-536-5915)

Commodore Computer Club, P.O. Box 6000, Fort Smith, AR 72906

CALIFORNIA

Commodore 64 West User Group, 2306 W. 180 St., Torrance, CA 90504

Southern California Commodore Users Group (SCUG), 11018 E. Rosecrans Ave., Ste. 203, Norwalk, CA 90650 (BBS# 213-927-5016)

Los Angeles County Commodore Club, 5947 Reno Ave., Temple City, CA 91780

K-North, 1616 Wagon Wheel Dr., Ocean-side, CA 92057

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FOG International User's Group, P.O. Box 3474, Costa Mesa, CA 92628 (Postal group)

North Orange County Computer Club,

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El-Shift-Oh Commodore User's Group, P.O. Box 361348, Melbourne, FL 32836-1348

Big One Group, Erick Rodriguez, 4271 NW S-TAM CNL Dr. 205, Miami, FL 33126

M.I.C.E., 11110 Bird Rd., Miami, FL 33165

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Commodore User Group of Venice, P.O. Box 3325, Venice, FL 34293

Commodore Country Club, 9125 U.S. 19 N, Pinellas Park, FL 34666

Lake/Sumter Commodore Users Group, P.O. Box 416, Leesburg, FL 34749

ILLINOIS

U.N.C.L.E., 533 N. 4th Ave., Des Plaines, IL 60016

Fox Valley 64 User Group, 833 Prospect, Elgin, IL 60120

S.W.R.A.P. User's Group, P.O. Box 342, Bedford Park, IL 60449

Peoria Area Commodore Users Group (PACUG), 2508 N. Rockwood Rd., Peoria, IL 61604-2216

Decatur Commodore Computer Club, P.O. Box 2752, Decatur, IL 62526-2752

Jacksonville Area Commodore Users, 4 Purcell St., P.O. Box 135, Murrayville, IL 62668

INDIANA

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IOWA

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Clinton Commodore User's Group, P.O. Box 743, Clinton, IA 52732

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Westinghouse Commodore User's Group, P.O. Box 8756, Baltimore, MD 21240

Hagerstown User's Group, 953 W. Washington St., Hagerstown, MD 21740

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Lenawee Commodore User's Group, 210 Chestnut St., Adrian, MI 49221

West Michigan Commodore Users Group (WMCUG), 1334 Riley, Hudsonville, MI 49426

MONTANA

Missoula Commodore User's Group, P.O. Box 331, Missoula, MT 59806

NEBRASKA

Lincoln Commodore User's Group, 5742 Saylor, Lincoln, NE 68124

Alliance Commodore Computer Club, 607 Toluca, Alliance, NE 69301

Panhandle Computer User Group, 1122 Ave. L, Scottsbluff, NE 69361 (BBS# 308-635-7244 and TDD# 308-635-7244)

NEW MEXICO

Deming Commodore User's Group, 1400 Mallory St., Deming, NM 88030

NEW YORK

Bronx User's Group, P.O. Box 523, Bronx, NY 10475

Morrisonville Commodore User's Group, Rt. 1, Box 61, Morrisonville, NY 12962

Triple Cities Commodore Society, P.O. Box 476, Binghamton, NY 13902

NORTH CAROLINA

Mayodan Commodore Users Group, 707 Virginia St., Mayodan, NC 27027 (BBS# 919-623-8900)

Greater Onslow Commodore Users Group (GOCUG), P.O. Box 1644, Jacksonville, NC 28541

OHIO

Commodore Computer Club of Toledo, P.O. Box 8909, Toledo, OH 43623

COM-NET, c/o Gladys Reinhardt, P.O. Box

390, Woodfield, OH 43793 (BBS# 708-433-8287)

OKLAHOMA

Stillwater Computer Society, 3124 N. Lincoln, Stillwater, OK 74075

OREGON

The Computer Group, P.O. Box 22233, Eugene, OR 97402

PENNSYLVANIA

Beaver County Area Commodore User's Group, P.O. Box 412, New Brighton, PA 15066

Pittsburgh Area GEOS Enthusiasts, 1219 Glencoe Ave., Pittsburgh, PA 15205

Capital Area Commodore Club, P.O. Box 309, Grantville, PA 17028-0309

Commodore Users of Lebanon County, P.O. Box 511, Richland, PA 17087

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Lower Bucks User Group, P.O. Box 397, Croydon, PA 19020-0959 (BBS# 215-788-8430)

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Box 9284, Longview, TX 75608
Metroplex Commodore Computer Club (MCCC), P.O. Box 813, Bedford, TX 76095 (BBS#s 817-268-4191 and 817-268-4196)

Abilene Cursor Control, P.O. Box 6261, Abilene, TX 79608

Midessa Commodore User's Group, 3611 Travis, Midland, TX 79703

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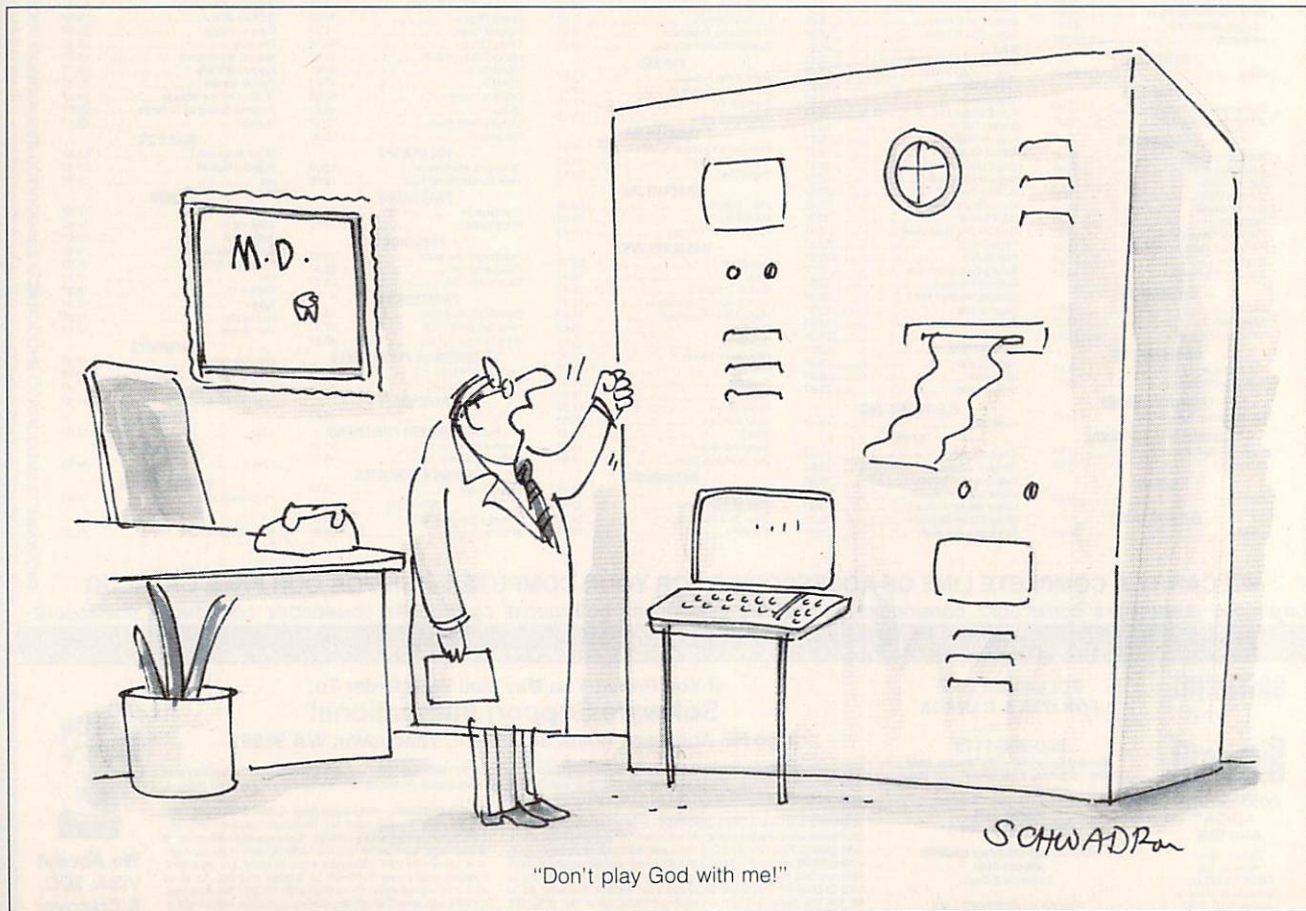
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REVIEWS

TONY LARUSSA'S ULTIMATE BASEBALL

Recently, there's been a wave of sports games for home computers released with celebrity endorsements. From Joe Montana to Jack Nicklaus, famous sports figures are lending their names to computer sports titles, some excellent and some only average.

The Oakland A's Tony LaRussa is the latest baseball manager to put his name on a game. The result, *Tony LaRussa's Ultimate Baseball*, has smooth graphics and simple gameplay. It's a whole lot of fun, but I'm not sure the word *ultimate* fits well in the title. That's because no game has everything that players want, but *Ultimate Baseball* is definitely one of the best baseball games out for the 64/128.

The game's interface is easy to learn. The main screen shows the bases and a little bit of the outfield, and the view shifts when necessary. During a pitch, a closeup of the pitcher and batter appears in the center of the main screen. The view is from behind the batter. When the ball is hit, the view tracks the flight of the ball. The statistics (score, runs, balls, strikes, and outs) are displayed beneath the main playing screen. Also, *Ultimate Baseball* displays the pitcher's name and average and the batter's name and batting average. Importantly, in the center of the strip along the bottom is a radar view with a black dot that represents each runner. This lets you keep track of the men on base when the view shifts into the outfield and bases are no longer visible.

Action begins after a short setup phase. Players select the difficulty level first. The Pro difficulty level requires the player to do everything. In the Rookie level, the computer fields the ball but doesn't throw it to the right plate. Also in the Rook-

When your team is fielding, there are more options. You can bring in a new pitcher; change your infield defense strategy; and play the outfield deep, shallow, or normal. These manager options require only a push of the joystick and allow complete con-



Smooth graphics and simple gameplay, make Tony LaRussa's *Ultimate Baseball* a whole lot of fun.

ie level, when the player turns pitching over to the computer, it always tries to throw a strike. The difficulty option allows newcomers to *Ultimate Baseball* to jump right in and have a fighting chance. Next, players choose the starting lineup and batting order. Then the real fun begins!

Ultimate Baseball has a lot of features that make playing the game effortless, with all of the attention placed on the game itself. The feature that separates this game from other baseball simulations is the manager option. At any time in the game, you can interrupt the current play and make a managerial decision or turn control over to the computer. If your team is at bat, the manager options are pinch hit, pinch run, and bullpen (to warm up a relief pitcher).

trol of your team's strategy. You make your selections and all other choices in *Ultimate Baseball* by moving the joystick.

Graphically, *Ultimate Baseball* is very nice. The stadium is big, and it takes a good wall-p to knock a ball out of the park. The animation is very good, especially in the closeup view of the pitcher and batter. Their movements are realistic. Also, if there's a runner on second base, you can see him shifting back and forth in the background.

Ultimate Baseball pans the view to follow the ball quickly. This is important for close plays. The radar view completes the graphics information both players need. Overall, *Ultimate Baseball* is a slick-looking game with a well-organized screen. Players can focus on the game and not have to worry about

finding the right view.

Expansion disks are on the way to complete the *Ultimate Baseball* playing environment. The teams that come with the game have the best players from the history of baseball on each team. From Mike Schmidt and Nolan Ryan to Wade Boggs and the infamous Pete Rose, players are represented by their average career stats. Future expansion disks include the greatest teams from 1901 to 1968, the greatest teams from 1969 to 1989, and the 1990 teams. These disks will add more excitement to the game, but nothing beats head-to-head play in *Ultimate Baseball*. The game allows single- and two-player games and even lets you place both teams under computer control so you can sit back and watch the action.

Although 64/128 owners miss out on some features found in other versions of the game, this one is still quick moving and a lot of fun. Unlike some other baseball games I've played, batting doesn't require unforgiving accuracy. This is important in the heat of a battle on the dirt diamond. The sound effects are nice, and the opening theme gets you in the mood. If you're looking for a fun, expandable baseball game for your home computer, *Ultimate Baseball* makes a strong argument for your adding it to your library.

Tony LaRussa should be happy to have his name on *Ultimate Baseball*. Play ball!
RUSS CECCOLA

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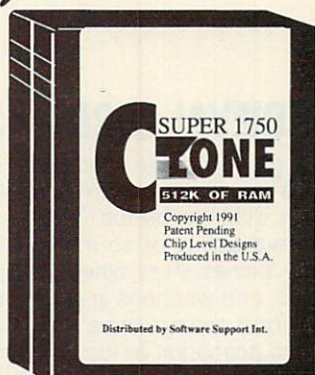
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MEDIEVAL LORDS

War games set in modern times sometimes contain too much detail to be fun. With the availability of so many tanks, planes, ships, other vehicles, and weapons in your electronic arsenal, there's no limit to scenarios or focus.

Medieval Lords takes the player back to a time where such machines didn't exist. It puts the emphasis on the power of soldiers to win battles. With the feel of the conquest board game Risk and enough pseudohistorical events to make the game more realistic, *Medieval Lords* is a challenging romp through the Middle Ages in Europe, North Africa, and the Middle East.

Your role in *Medieval Lords* is that of an adviser to a leader (king, emperor, sultan, or duke) of a number of provinces. Each group of provinces is a domain. The goal of the game is to help expand your lord's domain through diplomacy, politics, economics, and battles. Points earned throughout the game determine your overall success.

The game system is flexible and lets you alter the computer player's skill level, game length, portion of map used, and number of actions per turn. *Medieval Lords* allows as many as ten players, with up to six computer players. Each turn phase in *Medieval Lords* represents one game year. With six scenarios in the game and variable game length, players can enjoy simple ten-year challenges or undertake century-long conquests.

Medieval Lords starts the player with only a few provinces in a domain. It takes only a few moves to get used to the game's interface. From then, you'll be building

empires of which Napoleon himself would be proud. The game is controlled entirely by joystick. You enter commands by making selections from various menus. A map of nearby provinces takes up almost the entire screen, with room left on the bottom for the current command menu. The map scrolls and shows only a small portion of the overall game map.

Each turn in *Medieval Lords* consists of three phases: an events/tax collection phase, an action phase, and an end year phase. The first phase is largely informational. It itemizes any significant events and tells you how much money you'll take in that year.

One of the setup options at the beginning of the game concerns display mode. The choices are to display all actions, war actions only, actions affecting players only, and actions affecting humans only. You will initially notice the differences in display mode in the events/tax collection phase.

You can waste a lot of time reading messages in *Medieval Lords*. To speed gameplay, I would suggest setting the display mode to actions affecting players only to eliminate extra information that may not affect the game. After the events/tax collection phase, you'll know how you stand financially as well as politically. Deaths, births, crusades, plagues, and invasions are all revealed during this phase. Note each event and use that information to guide your actions in the next phase of the game.

You make all your decisions and important moves in the action phase. You can perform as many minor actions and information requests as you want, but only as many major actions as

you selected during game setup. Major actions include raising armies, subverting nobles, building castles, and supporting towns. Minor actions include moving armies, declaring war, and proposing an alliance.

You'll quickly learn the best approach to some situations. If you make the wrong decisions, you have another chance to better your position during the next year. The first phase sets up the situation, and the action phase lets you react. The action phase is the fun part of the game.

The end year phase informs you of your financial situation and updates your score. You quickly learn whether or not you've made the right moves in the action phase. In the first few turns of the game, you'll probably fall into debt. If you go into debt beyond double your income for that year, you have to correct your status in this phase. A deficit strategy menu pops up from which you may choose such actions as bluffing it out or depriving forces by not paying soldiers.

Medieval Lords is set up logically, and gameplay goes smoothly. The variety of conditions under which you may play increases the game's replay value. The manual is well organized, and a reference section takes up half of the text.

Martin Campion, a professor of history, designed the game and brought his professional expertise into the gameplay. Events like the Black Plague, nomadic invasions, and the influential presence of a Pope make *Medieval Lords* more historically accurate. Campion's goal was to design a game in which you can take an active part in the Middle Ages

through your advice to a powerful ruler. He succeeds in this goal and provides us with a game that's fun and challenging as well as informative and dynamic.

Instructors can easily use *Medieval Lords* as an effective teaching tool. It would certainly make a history class more interesting. Graphics are nothing special in *Medieval Lords*. The map consists of rough shapes to represent provinces. It does its job and nothing more.

There's no sound in the game. The strength of *Medieval Lords* is in its detail and successful attempt to bring the Middle Ages to life. Medieval times have always fascinated me. Life was simple by today's standards, but people who lived then had to be tough to survive.

Medieval Lords is perfect for anyone either interested in this time period or looking for a dynamic game of conquest that puts the action back in the hands of players.

RUSS CECCOLA

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THE WRITE STUFF

The Write Stuff word processor for the 64 caught my attention because it's one of the few programs that supports Commodore RAM expansion units (REU). It's proved to be a bug-free and docile program. It's also a powerful one that works nicely with Creative Micro Designs' Jiffy-DOS and Schneider Systems' Turbo Master CPU-enhancement ROMs. These or similar enhancement ROMs for speeding up the Commodore DOS and CPU are essential for high

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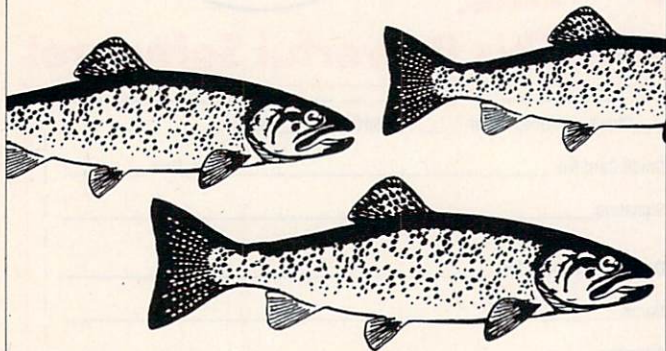
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productivity on a 64 system.

I love the way the program automatically loads the most recent rough draft (saved with a special filename) when it boots, as well as the convenience of being able to toggle multiple drives. *The Write Stuff* has all of the essential formatting features one expects in a fully endowed word processor.

Two text areas can be opened at one time to hold different documents, allowing for cutting and pasting between the two. Moreover, the size of the two areas can be varied in steps of 256 bytes for maximum flexibility and optimum usage of available memory.

Yet another welcome feature of *The Write Stuff* is its support of more than 60 user-definable keyboard macros. Commands which would normally require you to press three or four keys, such as the Search-and-Replace function, can be redefined and activated by keys of your choice. You could assign that function to the Commodore key and the S key, for example. Defined macros can be saved as defaults so that when the program is used again, those keys already are defined. The same holds true for printer macros.

A child can easily use this program with its onscreen menus. The keys that invoke various commands and functions are logical, and learning them requires little help from the manual. On the other hand, a seasoned writer can really put this word processor through its paces in command mode with the program's macros and other advanced features.

The manuals are very well laid out, indexed in detail, clear, and informative (almost pithy in places). Plenty of help files and tutorials exist on the disks for those who need more assistance. The program isn't copy-protected; therefore, you don't have to shell out extra dollars for backups.

The integrated spelling checker is reasonably fast

and intelligently designed. It uses two dictionaries, a short one (17,000 words) for quick checking and a larger one (61,000 words) for more thorough checking. If you need additional words, another 15,000 can be added, bringing the total to more than 93,000 words!

The REU can hold the dictionary and speed up the spelling-check process immensely, providing you don't mind the initial loading time. If you plan to check the spelling of several documents in one session, then using the REU is a worthwhile option.

A readable high-resolution 80-column preview helps you check page formatting and the layout of any tables. All colors (menu, background, clock, and so on) can be modified and saved as defaults.

The program's 16 printer toggles and 20 printer macros enable you to invoke advanced printer functions. Up to eight predefined printer control codes can be sent for each macro. You can even change the printer's secondary address while printing. Thus, Commodore graphic characters can be printed using secondary address 0 (Commodore emulation) and advanced printer functions can be accessed using secondary address 4 (transparent emulation) in the same document. Since all printer codes are user-definable, *The Write Stuff* can support most dot-matrix, letter quality, and laser printers.

Now to voice some beefs. The manual glosses over the actual method of invoking printer macros, although a help file makes it easy to figure out. Also, the program indicates the cursor position by column and paragraph numbers, but not by line number. That added feature would help when formatting nonstandard page lengths or pages with a mixture of fonts that print six or eight lines per inch.

One gripe that I have against this and most other 64 word processors (except *geoWrite*) is the limited size

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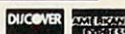
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of documents it can hold in RAM. A 15K–22K text space is simply not adequate for serious work. Linked files (supported by *The Write Stuff*) are all right when printing, but not for editing. One cannot search and replace a phrase or check the spelling across several linked files. For its price, however, I can't realistically expect *The Write Stuff* to be any better.

The other problem I have is with tables. This complaint isn't aimed specifically at *The Write Stuff*, but at all similar 40-column word processors. Programs like *Omniwriter* or *geoWrite* with their scrolling displays make it much easier to line up columns. Word processors with an 80-column editing mode are better, but 40-column editors wrap the rows of a table over two lines, making it tough to check alignment.

For preschool children and visually impaired users, there's even a talking version of *The Write Stuff*. The quality of the speech can be altered using up to nine voices with different pitch, mouth, throat, and speed controls. A very useful feature is the phoneme generator. As *The Write Stuff* with the required Software Activated Mouth reads a document, it can generate a phoneme file, which can be edited like a word processor file to produce a less robot-like pronunciation and inflection.

In summary, I can confidently state that 64 users will rarely come across a program in any category that offers so much power, flexibility, and ease of use at such an affordable price.

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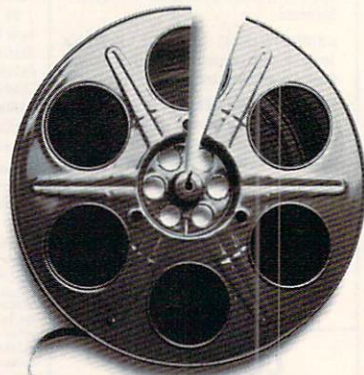
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MACHINE LANGUAGE

Jim Butterfield

PUTTING A HEX ON YOUR OUTPUT

Sometimes, a program needs to print a value in hexadecimal. The byte to be printed must be broken in two. The high nybble is obtained by performing four LSR operations, and the low nybble by ANDing #0F with the original value. Each of the two values will then be a binary number 0-15. All you need to do is change this value into a printable ASCII character from 0 to 9 or A to F.

If the binary value is in the range from 0 to 9, you can OR a value of \$30 to get the ASCII equivalent. If the value is in the range from 10 to 15, you must add \$37 to put it in the range A-F.

Assume that a four-bit value, 0-15, is in the A register.

```
ORA #30
CMP #3A
BCC GOTDIG
ADC #06
GOTDIG. . . .
```

The program adds \$30. If the value exceeds \$3B, it adds \$07 more. It looks as if we're adding \$06, but the set carry bit makes a total of \$07.

The method described uses eight bytes of code and does the job well. You might occasionally see an interesting alternative method which uses the computer's decimal mode. Decimal mode for hex calculations? Read on. Decimal mode operates only on the ADC (Add with Carry) and SBC (Subtract) commands. In decimal mode, the normal binary add or subtract is performed; then the computer inspects the result to see if it needs decimal adjustment. Thus, binary \$08 plus binary \$07 would add to produce binary \$0F; in decimal mode, the computer would say, "I'll

adjust that to hex \$15, since F is not a valid decimal digit." Consider what would happen if we added 0 in decimal mode to a nybble value in the range from 0 to 15. Decimal mode performs the addition: 0 to 9 remain unchanged, but value 10 to 15 (hex A to F) are adjusted to new values of \$10 to \$15. We've added six to those numbers—without a program test!

There's still a piece missing. We wish to add seven, not six, to these high values. Can we do it? Yes, if we use a trick. Instead of adding 30 to your original nybble, we'll use two additions to add a total of 130—in decimal mode, of course. The extra hundreds digit will disappear. It's a carry that we'll never use.

In the following code, see if you can detect how the carry bit is triggered.

```
SED
CLC
ADC #90
ADC #40
CLD
```

This month's program will read any program file you name and print out the first two bytes as a hexadecimal address. If the load address is \$0801, the program file is likely from a 64. A value of \$1C01 signals a 128, and \$0401 will spot a program that's load-compatible with the early PET/CBM type computers. Addresses from the VIC-20 will vary, depending on how much memory has been fitted.

The 128 will produce a variant address if you save a program while in graphics mode. Almost all BASIC programs will have addresses that end in the digits 01. Addresses that don't end in 01 signal a program that starts in an unusual way. Such programs will usually be machine

language programs loaded with LOAD "filename",8,1.

The machine language program is poked into addresses \$2000 to \$2040. When it's called by the BASIC program, the selected file will already be open as logical file number 1. Our program connects to this file, grabs two bytes, and puts them into addresses \$2200 and \$2201. Then it prints a dollar sign. It calls a subroutine at \$202A to convert to hexadecimal and print. A carriage return is printed to wind up the job neatly; then control is passed back to BASIC.

The subroutine at \$202A splits the value it finds in the A register into two pieces of data (a high nybble and a low nybble). At \$2035, it converts each nybble to a printable hex digit and prints it. The decimal mode method is used.

BASIC pokes the machine language program into place, asks for the filename, opens the file, calls the machine language program, then closes the file. The file could have been opened and closed within the machine language program, but it's often more convenient to do a job like this in BASIC.

```
100 DATA 162,1,32,198,255
110 DATA 32,228,255,141,0,34
120 DATA 32,228,255,141,1,34
130 DATA 169,36,32,210,255,162
140 DATA 1,189,0,34,32,42,32
150 DATA 202,16,247,32,204,255
160 DATA 169,13,32,210,255,96
170 DATA 72,74,74,74,74,32,53
180 DATA 32,104,41,15,120,248
190 DATA 24,105,144,105,64,216
200 DATA 88,76,210,255
300 FOR J=8192 TO 8256:READ X
310 POKE J,X:T=T+X:NEXT J
400 INPUT "FILENAME";F$
410 OPEN 15,8,15:OPEN 1,8,3,F$
420 INPUT#15,E,E$,E1,E2
430 IF E<>0 THEN PRINT
   E$;E1;E2:END
440 SYS 8192:CLOSE 1
```



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CLEANING MY DESK

It's about time I did something with the odds and ends that have been accumulating on my desk, tidbits of information which don't lend themselves to a whole column or are follow-ups to previous columns.

Some of this information has been sent in by readers, some I've picked up on Q-Link, and some has come from chatting with people like Jim Collette (geoProgrammer extraordinaire) and Doug Cotton (chief something-or-other at Creative Micro Designs). I figure we can't go wrong with a column like this once in a while. I gain mouse-space on my desk, and you get a few gems of geoKnowledge to improve your work with GEOS.

Probably the most important addition you can make to your GEOS system is RAM expansion of some kind. While 512K is great, it's not the top of the line. REU upgrades are available from Melvin Montgomery (1504 Amherst Drive, Plano, Texas 75075); he will turn your 1750 into a 2MB powerhouse for \$200. If that's a little too expensive for you, he offers a variety of configurations for any of the 1700-series expanders or for geoRAM. He also sells RAM chips with instructions enabling you to do the upgrade yourself. If you want more information, write or talk to him on Q-Link, where his screen name is CMDR FIXER.

In my the August 1991 column, I discussed graphics utilities. I mentioned *ScrapIt!*, which clips large photo scraps from *geoPaint* pages. Several readers have written or sent me E-mail to suggest other useful graphics utilities.

Dick Estel of Fresno, California, recommends another utility called *ScrapIt!*—same name but with an exclamation

point. This program has the added feature of being able to import oversized scraps into *geoPaint*, not just *geoPublish*. *ScrapIt!* is by Michael W. Schell. It's shareware, with the fee to be donated to the Cystic Fibrosis Foundation.

ScrapIt! is also a graphics conversion program, translating *Doodle* and even *Koala* files with colors pretty much intact. Now that's quite a trick! You can download *ScrapIt!* from Q-Link. The files you need are SCRAPIT.SDA64 and SCRAPIT.DOC.SDA, uploaded by MichaelS30. I'll also put copies in BBS Post's GEOS section. Its telephone number is (616) 534-1346).

Also in the August column I mentioned *Screen Grabber*, which allows you to clip any section of the screen into a photo scrap. A similar program called *geoFetch* appeared on Lodestar disk #65. Back issues of Lodestar disks are available for \$14.95 plus \$1.50 shipping and handling from Softdisk Publishing, P.O. Box 30008, Shreveport, Louisiana 71130-0008. Make sure you request the disk by number.

I was getting very frustrated the other day trying to get a new AUTO.EXEC file to run on my boot disk. I called Jim Collette, the program's author, and he assured me that it should work, even with geoRAM, which occasionally causes troubles. As it turned out, the culprit wasn't the program but my boot disk. I had created a double-sided boot disk using *Maverick* so that I could put more files on it. I use a routine to load my RAM automatically as I boot, so I wanted *geoWrite* and some associated files on the boot disk. The AUTO.EXEC wouldn't run.

When I mentioned this problem to Collette, who has written plenty of AUTO.EXEC programs (*geoWizard* for example), he told me that the *Mav-*

erick routine for creating a double-sided boot disk has a bug in it. It makes the disk's boot routine forget that it's double-sided during the boot process. By the time the boot is over everything is back to normal, but if an AUTO.EXEC file is stored even partially on the back side of the disk, it will be inaccessible during the boot. Obviously, this would prevent the AUTO.EXEC from running.

A partial solution to this problem is to put your AUTO.EXEC files onto a new double-sided boot disk, before filling the disk with other files. This will ensure that the program is stored entirely on the front of the disk. Unfortunately, if your AUTO.EXEC is a file copier, as mine was, the files it'll be trying to copy might also be invisible on the back of the disk. As if that weren't enough, there's another possible problem. If you're booting in 80 columns, an AUTO.EXEC written only for 40 columns will be ignored during the boot routine. It simply won't run.

If you bought your *geoPublish* when it was first released, you probably received the one-disk version. This program is currently shipped in a two-disk version which has fixed several niggling little bugs. The version is still 1.0, although I'm told some files created with the second version difficult for the earlier version to read. The second disk is a clip art disk. If you want the upgraded version of *geoPublish*, send your old disk and a \$7 upgrade fee to BSW Replacement Department, 2150 Shattuck Avenue, Berkeley, California 94704. Include a note requesting the free upgrade/fix.

There! My desk is somewhat cleaner, but feel free to help me add to the clutter. Write to me in care of this column or send me E-mail on QuantumLink (SteveV14). I'll pass the word along. □

Here's a collection of odds and ends, that include REUs, graphic utilities, and AUTO.EXEC programs that refuse to run.

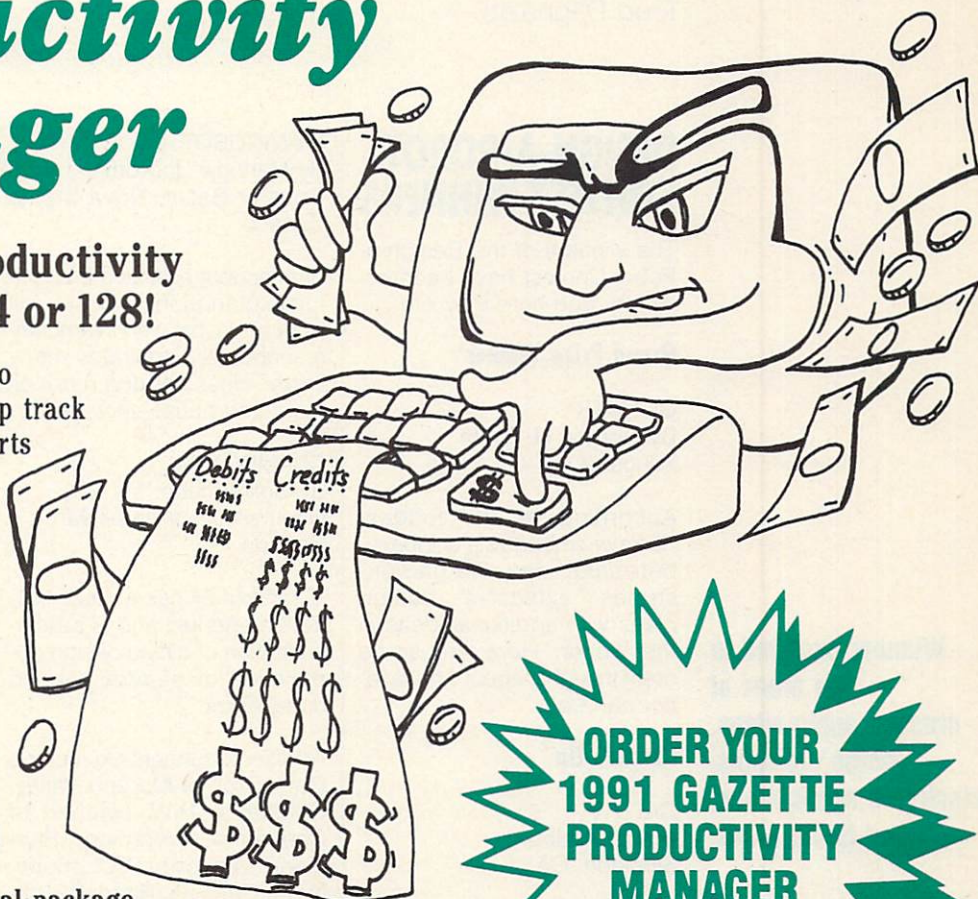
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By Gordon H. Smith
Kenosha, WI

According to the judges, "Golmer embodies a unique robot-rental idea. He demonstrates extensive design plans with additional ideas in the works. Here are some great thoughts about what a robot can be!"

Runners-Up

CAT

By Lin Tholborn
Stockton, CA

"CAT (Certified Actual Tool) has clever adaptive attachments, both whimsy and precision in the design, and well-thought-out remarks on functions and purpose: Robots are the outstretched arm of mankind."

ALFRED

By Michael Tennant
Washington, PA

"Alfred shows a delightful adaptation of butler features (a solar cell bowler, for example). It combines a match of robot design and personal robot experiences and ideas."

ISAAC

By David Barrett
Saginaw, MI

"Isaac indicates a clear understanding of robot elements and exemplifies a unique idea of robot software. With Isaac around, there would be many less worries."

IMMACUBOT

By Matthew Boardman
Chester Basin, Nova Scotia
Canada

"Immacubot acts as a thoughtful explanation of what will work and what won't work. Immacubot demonstrates many clever ideas about a robot as maid and house servant."

CRAMBOT 64

By Colin Wiebe
Guernsey, Saskatchewan
Canada

"Crambot 64 has a great illustration and key and is a demonstration of a nice design application of general robotic capabilities."

Additional runners-up include Gary Croll of Moreno Valley, California; R.W. Hansen of Cheyenne, Wyoming; Raymond Ellsworth of Charlotte, North Carolina; Randall Slinkard of San Diego, California; and Anthony Dannolfo of Whitestone, New York.

Judges' Summary

As a judging team we were first impressed with the variety of responses. Each designer clearly created a robot of his or her own imagining. The robots' functions ranged from home security to maintenance of a golf ball driving range. In all, the most favorable entries were those which, more than supercomputers, fit the definition of a robot as a reprogrammable, multifunctional manipulator with mobility and sensory capabilities as defined by job needs. Furthermore, the contest winners demonstrated extensive thinking in the areas of creative applications, design concepts, electronic applications, and future plans.

With these parameters, neither the age of the designer nor the actuality of the design

(several entries are possible fantasies) seemed relevant. The ability of the entrants to communicate their ideas became the great equalizer.

The Judges

Julie Thomas is an elementary teacher who caught the robot bug from her students. She has been recognized by US West, the Cooper Foundation, and the National Science Teachers Association for her work in teaching robot classes for teachers and kids in Nebraska. Thomas is a graduate teaching assistant at the University of Nebraska at Lincoln while working on a doctorate in science education. Thomas has an art teacher husband and two teenage daughters.

Edward Radanovich was our other judge. He is a math teacher, computer science teacher, and computer specialist at Omaha South High School in Nebraska. Radanovich became interested in the use of robots in education while teaching at South High. During the last five years he has included units on robotics in his computer literacy classes. He and his classes have programmed the RB5X robot and have assembled several of the MOVIT robots like those offered as prizes in the contest.

Prizes for the contest include a CompuBot robot, a Capsela 2000 robot, and MOVIT robots.

I want to thank everyone for your delightful, humorous, and ingenious robots! They were a pleasure to review, and they've given the judges and me hope that the robot revolution may one day still happen.

In my column next month, we'll take an in-depth look at the grand prize-winning robot, Golmer, and its designer, Gordon H. Smith. □

Winners excelled in the areas of creative applications, design concepts, electronic applications, and future plans.

BEGINNER BASIC

Larry Cotton

THE KEYBOARD BUFFER

This month I'll present a short program that makes use of the 64's keyboard buffer. For those who are unfamiliar with the buffer, it's a ten-byte long area in the 64's memory, from 631 to 640, which stores keystrokes until the computer has time to process them. There's also a memory location, 198, which contains the number of bytes currently stored in the keyboard buffer. We'll touch on that as well.

You may have noticed the buffer in action when you out-type *SpeedScript* or some other word processor. When you pause, the buffer gets its chance to spew its contents. You can also see its effect by listing a BASIC program and then, while it's listing, entering RUN and pressing Return.

To test the effects of the keyboard buffer in the immediate mode, enter a fairly long FOR-NEXT loop and then type a few (ten or less) keys while the loop is running. Make sure your loop is long enough to give yourself enough time to enter several numbers or letters. After the loop ends, the characters you typed will be displayed on the screen. Those characters were stored in memory locations 631-640, while the total number of characters entered was stored in memory location 198.

This type of buffer is known as FIFO. That stands for First In, First Out. This lets you enter characters or text faster than the computer can print them, without losing characters. The first character you type will be the first one the computer prints. Characters entered after the buffer is full will be ignored.

You can use this little buffer in an unusual way to simulate keystrokes. That is, you can

trick the 64 into thinking that you have typed characters, when in fact they were poked in. Tricking the computer in this way is called using the dynamic keyboard technique. The below program illustrates this technique.

COLORCALC

```
EA 10 REM TO DO SQR(X) ENTER X↑(1/2)
SM 20 CS=CHR$(175):DS=CHR$(20):ES=CHR$(61)
GF 30 POKE214,13:PRINT:PRINT"{GRN}PRESS ANY KEY. . ."
ME 40 POKE214,16:PRINT:PRINT"{6 SPACES}"
HB 50 GETAS:IFAS=""THEN50
DD 60 PRINTCHR$(147):POKE53280,1:POKE53281,1
BQ 70 POKE214,7:PRINT:PRINT"{RED}ENTER NUMBERS AND SIGNS, THEN PRESS ={DOWN}{BLU}"
AK 80 GOSUB150:X$=B$
BF 90 PRINT"{WHT}PRINT"X$
BK 100 PRINT"{3 DOWN}RUN{BLU}"
BD 110 FOR=631TO637:POKET,145:NEXT
GJ 120 POKE638,13:POKE639,13
AH 130 POKE198,9
CS 140 END
MR 150 B$="":L=0
MH 160 PRINTCS;
BB 170 GETAS:IFAS=""THEN170
EQ 180 IFAS=DS THEN GOSUB240:GOTO160
PJ 190 IFAS=ES THEN PRINTD$A$:RETURN
MQ 200 IFAS=CHR$(94) THEN220
XX 210 IFAS<CHR$(40) OR AS>CHR$(57) OR AS=CHR$(44) THEN170
BM 220 PRINTD$A$;B$=B$+AS:L=L+1:IFL=39 THEN ENDD
MC 230 GOTO160
KG 240 IFL=0 THEN PRINTD$;:RETURN
JC 250 PRINTD$A$;L=L-1:B$=LEFT$(B$,L)
CG 260 RETURN
```

This is a program that converts your 64 into a calculator. You may enter any string of numbers and signs, and the computer will process them in

the correct mathematical order. (This simple program will not accept trigonometric functions or scientific notation, but it will accept parentheses and exponents.)

Briefly, here's how it works. The calculation line, as it's entered, is stored as B\$ (line 220). Illegal characters are screened out, except for the Insert/Del key. When the user presses the equal sign, X\$ becomes B\$ (line 80). The tricky part is line 90, where the word PRINT and X\$ get printed in the same color as the screen. Since that color is white, you can't see it, but it's there.

Then the cursor moves down three lines and prints the word RUN—again in white—so it's hidden from the user. Now it's simply a matter of bringing the cursor up to the line which contains PRINT and simulating a press of the Return key. This is where the dynamic keyboard comes in. Line 110 pokes seven cursor-ups into the keyboard buffer, while line 120 pokes CHR\$(13) twice. Line 130 pokes the number of keystrokes to memory register 198. Meanwhile, the cursor has been changed from white back to blue (end of line 100), so the answer is printed in blue on a white background—quite readable. The second carriage return is strategically placed on the line where RUN has been entered and is waiting for a new calculation, which effectively starts the program from the beginning again. If you'd like to see what's happening—albeit rather quickly—POKE 53280 and 53281 with a 0 in line 60.

Next month we'll write a handy little program that will print amortization schedules. It can be of use to anyone who is buying a home and has a mortgage. □

The 64's keyboard buffer holds keystrokes until the CPU is ready to process them.

PROGRAMMER'S PAGE

Randy Thompson

PEEKABLE POKES

I remember how frustrating it was when I wrote my first BASIC sound program. Poking the proper numbers into the 64's SID chip registers was difficult enough, but every time I peeked those registers to manipulate the values stored there, all I got was a 0. Nothing seemed to work.

No doubt you veteran 64 programmers out there know what I was doing wrong. As most of us have already learned, all but the last four SID chip registers are write-only. In other words, they can be poked but not peeked. Peeking any one of the SID chip's first 25 registers returns a value of 0, no matter what value that register actually contains. When trying to create and edit sounds, this limitation can be quite irritating.

A few years ago I solved this problem with a little machine language routine I call *Peekable Pokes*. As the title suggests, this program allows you to peek the SID chip registers (locations 54272-54300) and receive the value of the last number poked there. For example, to find your 64's volume setting, all you have to do is peek location 54296.

Peekable Pokes is listed below in the form of a BASIC subroutine. When executed, this subroutine stores *Peekable Pokes*' machine code in memory at locations 49152-49295 and then installs the routine with a SYS command. You can include this subroutine in your own programs and execute a GOSUB 1000 to activate *Peekable Pokes*. Of course, you may change the subroutine's line numbers if you need to. Line 1030 returns you to your main program.

Peekable Pokes works by intercepting the computer's normal PEEK and POKE routines.

When one of these two BASIC commands is used, *Peekable Pokes* is called instead. At this point, *Peekable Pokes* determines whether or not the memory location being accessed is a SID chip register. If not, control is given back to the normal ROM routines. If it is, one of two things happens, depending on whether the statement intercepted is a PEEK or a POKE.

In the case of a POKE, the value being poked is stored in two places. Not only is it placed in the appropriate SID chip register, but it is also placed in a special storage buffer located in memory at locations 49295-49323. By placing this number into normal RAM, we can peek it later.

The way this new PEEK routine works is simple. Instead of fruitlessly peeking the specified SID chip register (as the BASIC command would do), *Peekable Pokes* retrieves the corresponding value from its storage buffer.

When using *Peekable Pokes*, keep in mind that you must install the machine code before you poke any values into the SID chip. And unless you have previously poked a number into a register, you cannot reliably read that register via PEEK.

Speaking of the SID chip, this music and sound effects generator gives the 64 impressive audio capabilities. Each of its three separate voices has 16-bit frequency resolution, waveform control, envelope shaping, oscillator synchronization, and ring modulation. When you add high-pass, low-pass, and band-pass filters, it's no wonder programmers can make the 64 talk.

How about sending me some small sound programs for possible publication here in "Programmer's Page." What I'm looking for are crazy sound effects—no songs, just

some good honest weird noises. I'd like to build a collection of laser zaps, engine roars, squeals, blips, kabloooooees, and so on. If your sound is published, you'll receive our usual monetary compensation.

So, please, mail in those sound effects. Send your programming tips and tricks to Programmer's Page, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We pay \$25-\$50 for each tip we use.

PEEKABLE POKES

```
CK 1000 REM PEEKABLE POKES
MB 1010 FOR I=49152 TO 49295:READ D:CK=C
      K+D:POKE I,D:NEXT
ED 1020 IF CK<>15281 THEN PRINT "*** ERROR IN DATA STATEMENTS ***":END
JD 1030 SYS 49152:RETURN
HA 1040 DATA 169,21,141,8,3,169,192,141
GG 1050 DATA 9,3,169,70,141,10,3,169
RK 1060 DATA 192,141,11,3,96,32,115,0
FP 1070 DATA 32,30,192,7,6,174,167,208,1
FF 1080 DATA 96,233,128,144,7,201,23,240
BD 1090 DATA 6,76,243,16,7,76,165,169,32
GR 1100 DATA 115,0,32,23,5,183,32,132,192
XR 1110 DATA 208,9,32,39,184,164,20,153
DC 1120 DATA 143,192,96,76,39,184,169,0
KR 1130 DATA 133,13,32,15,0,201,194,240
KJ 1140 DATA 6,32,121,0,76,141,174,32
GQ 1150 DATA 115,0,32,24,1,174,169,107,133
RR 1160 DATA 85,169,192,133,86,32,84,0
JM 1170 DATA 76,141,173,165,21,72,165,20
KE 1180 DATA 72,32,247,183,32,132,192,208
QK 1190 DATA 8,164,20,18,5,143,192,76,26
FQ 1200 DATA 184,76,22,184,165,20,201,24
JE 1210 DATA 176,4,165,21,201,212,96,0
```

Here's a way
to peek
the SID chip's first
25 registers
to determine what
values have
been poked there.

PROGRAMS

GRAPHOS For C-128

By Frank Gordon

Certain aspects of math and science can be difficult to comprehend in a purely theoretical presentation. For many people, it helps to have such material presented in the form of a graph. That's where *Graphos* comes in.

Graphos (graph operating system) is a graphics tool for studying math and science formulas. It serves as electronic graph paper, enabling a student to rapidly explore and plot different math and science equations.

Typing It In

Graphos is written entirely in machine language, but it loads and runs like a BASIC program. To enter it, use *MLX*, our machine language entry program; see "Typing Aids" elsewhere in this section. When *MLX* prompts you, respond with the values given below.

Starting address: 0801

Ending address: 0BE0

Be sure to save a copy of the program before you exit *MLX*.

Graphos installs a modified copy of BASIC in RAM, giving you four new programming commands.

SCREEN1 turns the hi-res screen on, and SCREEN0 turns it off.

HUE0,1 provides for a plot of black lines on a white background. HUE1,0 would print white on black. Use any of the 64's 16 colors for the combination of your choice.

WIPE rapidly clears the hi-res screen.

PLOTX,Y (or other defined variables) graphs a function.

Since *Graphos* operates with a modified BASIC in RAM, certain error conditions and pressing the Run/Stop-Restore keys will cause the original ROM to reappear. To reengage *Graphos*, enter POKE 1,54. These new functions are illustrated in the demonstration programs *Axis* and *Vibration*.

Using the Program

When you load and run *Graphos*, it sets up the graph operating system with its new BASIC commands. You can then load and run your own BASIC plotting programs such as *Axis*, which

serves as a demonstration program.

Let's take a look at *Axis* to examine some useful features. Because the x-axis prints differently to the screen and printer, line 110 gives you a choice between the two. The default is S. For either the screen or printer, the constants Z, Z1, and Z2 are set to give an undistorted graph. The position of the coordinate system is controlled by the variables XT, YT, XS, and YS in line 155. These establish the position of the x- and y-axes and their starting positions. Then EX and EY expand or scale the graph. Setting these variables in line 155 means that you can rapidly change the axis positions. For example, list *Axis* and change a few of the variables. Here are three different versions you may want to try. The first changes only line 155; then a few additional changes are added.

155 XT=159: YT=10: XS=Z1: YS=10: EX=5*Z:
EY=2

155 XT=Z2: YT=10: XS=Z2: YS=10: EX=20*Z:
EY=2

250 FOR X=0 TO 8 STEP .05

155 XT=Z2: YT=100: XS=Z2: YS=0: EX=3*Z:
EY=10

250 FOR Y=-8 TO 8 STEP .05

260 X=Y*Y

270 X1=EX*X+XT: Y1=EY*Y+YT: PLOTX1,Y1:
NEXTY

Once the x-axis and y-axis have been set, the program can be used as a template for others.

Vibration is another sample program. It illustrates a common curve found in science. The vibration is damped by friction or some other outside force, such as a shock absorber. Change variable DF to modify the degree of damping.

GRAPHOS

0801:0C 08 0A 00 9E 20 32 30 64
0809:36 32 00 00 00 A0 00 84 C7
0811:61 A9 A0 85 62 B1 61 91 D6
0819:61 C8 D0 F9 E6 62 A5 62 34
0821:C9 C0 D0 F1 A0 02 B9 D9 D9
0829:08 99 BE A0 88 10 F7 A0 9A
0831:03 B9 DC 08 99 E5 A0 88 7B
0839:10 F7 A2 05 BD E0 08 9D 13
0841:F1 A0 CA 10 F7 A2 03 BD DA
0849:E6 08 9D 09 A1 CA 10 F7 63
0851:A9 4B 8D 1C A0 A9 C4 8D 3F

0859:1D A0 A9 82 8D 30 A0 A9 95
0861:C4 8D 31 A0 A9 35 8D 40 E4
0869:A0 A9 C4 8D 41 A0 A9 0B 90
0871:8D 36 A0 A9 C4 8D 37 A0 EF
0879:A9 4C 8D 3A A4 A9 00 8D 20
0881:3B A4 A9 C4 8D 3C A4 A0 21
0889:EA 84 FB A9 08 85 FC A0 3B
0891:00 84 FD A9 C4 85 FE A0 F7
0899:00 B1 FB 91 FD C8 D0 F9 5D
08A1:E6 FC E6 FE B1 FB 91 FD CF
08A9:C8 C0 31 D0 F7 A0 1B 84 7E
08B1:FB A9 0A 85 FC A0 00 84 B2
08B9:FD A9 CC 85 FE A0 00 B1 51
08C1:FB 91 FD C8 D0 F9 E6 FC B9
08C9:E6 FE B1 FB 91 FD C8 C0 D9
08D1:C5 D0 F7 A9 36 85 01 60 BC
08D9:48 55 C5 50 4C 4F D4 53 BD
08E1:43 52 45 45 CE 57 49 50 DB
08E9:C5 20 18 C4 8A 0A AA C0 52
08F1:3D A4 50 46 53 20 9E B7 48
08F9:E0 01 90 05 F0 13 4C 48 D1
0901:B2 A9 1B 8D 11 D0 A9 15 47
0909:8D 18 D0 A9 97 8D 00 DD 6D
0911:60 A9 3B 8D 11 D0 A9 08 25
0919:8D 18 D0 A9 94 D0 EE A2 15
0921:20 A9 E0 85 FC A0 00 84 11
0929:FB 98 91 FB C8 D0 FB E6 B9
0931:FC CA D0 F6 60 20 7B C4 3D
0939:8A 0A 0A 0A 85 02 20 7F
0941:FD AE 20 7B C4 8A 05 02 16
0949:A0 C0 84 FC A0 00 84 FB 46
0951:AC D0 02 91 FB C8 D0 FB E6 8F
0959:FC CA 10 F6 91 FB C8 C0 DC
0961:E8 90 F9 60 20 9E B7 E0 1D
0969:10 B0 11 60 20 EB B7 86 7E
0971:02 A9 C7 38 E5 02 85 02 AF
0979:C9 C8 90 03 4C 48 B2 A5 73
0981:15 F0 0A C9 01 D0 F5 A5 15
0989:14 C9 40 B0 EF A9 00 85 D6
0991:FB A9 E0 85 FC A5 14 29 50
0999:F8 18 65 FB 85 FB A5 15 17
09A1:65 FC 85 FC A5 02 29 07 B4
09A9:18 65 FB 85 FB 90 02 E6 06
09B1:FC A5 02 4A 4A 4A 0A AA CA
09B9:BD F7 C4 18 65 FB 85 FB E4
09C1:BD F8 C4 65 FC 85 FC A5 7D
09C9:14 29 07 A4 00 00 78 A9 5B
09D1:34 85 01 B1 FB 1D 29 C5 07
09D9:91 FB A9 36 85 01 58 60 8D
09E1:00 00 40 01 80 02 C0 03 9C
09E9:00 05 40 06 80 07 C0 08 4F
09F1:00 0A 40 0B 80 0C C0 0D 02
09F9:00 0F 40 10 80 11 C0 12 B4
0A01:00 14 40 15 80 16 C0 17 68
0A09:00 19 40 1A 80 1B C0 1C 1B
0A11:00 1E 80 40 20 10 08 04 16
0A19:02 01 AD 00 DD 29 03 49 07
0A21:03 A0 06 0A 88 D0 FC 8D 4F
0A29:84 03 AD 18 D0 29 08 F0 A3
0A31:09 18 A9 20 6D 84 03 8D 18
0A39:84 03 A9 00 20 BD FF A9 27
0A41:04 AA A0 FF 20 BA FF 20 22
0A49:C0 FF A2 20 C0 9F FF B0 2B
0A51:03 4C 3D CC 4C 20 CD A9 96
0A59:08 20 D2 FF A9 0D 20 D2 68
0A61:FF A2 00 A9 01 8D C6 CD 52
0A69:A9 00 8D C7 CD A9 00 8D 23
0A71:C8 CD A9 C7 8D C9 CD 20 5E
0A79:E1 FF D0 03 4C 20 CD 8A D1
0A81:48 98 48 20 29 CD 68 A8 E4

PROGRAMS

```

0A89:68 AA AD CD CD 2D CB CD 97
0A91:F0 0C AD CA CD 0D C6 CD 81
0A99:8D CA CD 4C 8F CC AD C6 77
0AA1:CD 49 FF 2D CA CD 8D CA 35
0AA9:CD 0E C6 CD AD C6 CD C9 CB
0AB1:80 F0 14 18 AD C7 CD 69 D7
0AB9:01 8D C7 CD AD C8 CD 69 1D
0AC1:00 8D C8 CD 4C 5D CC AD 4E
0AC9:CA CD 09 80 E0 2D 90 0A C6
0AD1:AD CA CD 29 1F 09 80 8D 67
0AD9:CA CD 8E CF CD A6 02 8E 31
0AE1:CE CD A8 20 D2 FF 98 CE 7E
0AE9:CE CD D0 F6 AE CF CD A9 5C
0AF1:01 8D C6 CD A9 00 8D CA D2
0AF9:CD 38 AD C7 CD E9 06 8D E4
0B01:C7 CD AD C8 CD E9 00 8D 54
0B09:C8 CD CE C9 CD AD C9 CD F3
0B11:C9 FF F0 03 4C 5D CC E0 AC
0B19:2D B0 1F 18 AD C7 CD 69 E8
0B21:07 8D C7 CD AD C8 CD 69 89
0B29:00 8D C8 CD E8 A9 C7 8D A3
0B31:C9 CD A9 0D 20 D2 FF 4C 3E
0B39:5D CC A9 0D 20 D2 FF 20 A3
0B41:E7 FF 60 AD C9 CD 29 07 11
0B49:8D CC CD AD C9 CD 4A 4A 52
0B51:4A 8A B9 92 CD 85 FB B9 4D
0B59:AC CD 85 FC 18 A5 FB 6D 76
0B61:CC CD 85 FB A5 FC 69 00 B5
0B69:85 FC 18 AD 84 03 65 FC 57
0B71:85 FC AD C7 CD 29 07 49 26
0B79:07 A8 C8 A9 00 38 2A 88 AE
0B81:D0 FC 8D CB CD 18 AD C8 A0
0B89:CD 65 FC 85 FC AD C7 CD D3
0B91:29 F8 A8 8A 48 78 A2 34 D5
0B99:86 01 B1 FB A2 36 86 01 25
0BA1:58 A8 68 AA 98 2D CB CD A4
0BA9:8D CD CD 60 00 40 80 C0 7C
0BB1:00 40 80 C0 00 40 80 C0 B6
0BB9:00 40 80 C0 00 40 80 C0 BE
0BC1:00 40 80 C0 00 40 00 01 06
0BC9:02 03 05 06 07 08 0A 0B 1A
0BD1:0C 0D 0F 10 11 12 14 15 22
0BD9:16 17 19 1A 1B 1C 1E 1F 2A

```

AXIS

```

QA 100 REM -- AXIS --
CE 105 PRINT "{CLR}"
QH 110 PRINT "OUTPUT TO SCREEN
{SPACE}OR PRINTER (S/P)
{4 SPACES}S{3 LEFT}";:I
NPUTA$
KB 115 IF A$="S" THEN Z=1.33:Z
1=0:Z2=26.4:GOTO130:REM
VALUES FOR SCREEN OUTP
UT
BE 120 IF A$<>"P" THEN110
SC 125 Z=1.208:Z1=2.01:Z2=38.2
4:REM VALUES FOR PRINTE
R OUTPUT
QJ 130 SCREEN 1:HUE0,1
BE 135 WIPE
FJ 140 REM -- SET UP CONSTANTS
--
HS 145 REM -- XT AND YT SET X
{SPACE}AND Y AXES. XS A
ND YS SET START OF X AN
D Y AXES.
DG 150 REM -- EX AND EY ARE EX

```

```

PANSION FACTORS FOR X A
ND Y COORDINATES.
EX 155 XT=159:YT=100:XS=21:YS=
0:EX=5*Z:EY=1
GX 160 REM -- CALIBRATE X COOR
DINATES --
HM 165 FORX=XS TO319 STEP5*Z
KJ 170 Y=YT:PLOTX,Y:NEXTX
JF 175 FORX=XS TO319 STEP10*Z
BP 180 FORY=YT-1 TO YT+1:PLOTX
,Y:NEXTX:NEXTX
XH 185 FORX=Z2TO319 STEP50*Z
XE 190 FORY=YT-2 TO YT+2:PLOTX
,Y:NEXTX:NEXTX
AE 195 REM -- CALIBRATE Y COOR
DINATES --
JB 200 FOR Y=YSTO199 STEP5
KP 205 X=XT:PLOTX,Y:NEXTX
BX 210 FOR Y=YS TO 199 STEP 10
RM 215 FOR X=XT-1 TO XT+1:PLOT
X,Y:NEXTX:NEXTX
EB 220 FOR Y=YS TO 199 STEP50
FG 225 FOR X=XT-3 TO XT+3:PLOT
X,Y:NEXTX:NEXTX
BS 249 REM -- AXIS.1 GRAPH --
SQ 250 FOR X=-8 TO 8 STEP .05
HP 260 Y=X*X
GX 270 X1=EX*X+XT:Y1=EY*Y+YT:P
LOTX1,Y1:NEXTX
PQ 999 REM -- SCREEN OR HARDCO
PY --
GE 1000 GET A$:IF A$="" THEN10
00
JK 1010 PRINT "{CLR}":SCREEN 0
:PRINTCHR$(14)
RF 1020 PRINT"HARDCOPY (Y/N)
{4 SPACES}N{3 LEFT}";:I
NPUTA$:IF A$="N" THEN1
080
JR 1030 IFA$<>"Y"THEN1010
GF 1040 PRINT"SINGLE OR DOUBLE
WIDTH (S/D){4 SPACES}
S{3 LEFT}";:INPUA$
XB 1050 IFA$="S" THEN POKE2,1:
GOTO1070
KS 1060 POKE2,2:IFA$<>"D"THEN1
040
CR 1070 SCREEN 1:SYS52224
KS 1080 SCREEN 0:PRINTCHR$(14)
:LIST

```

VIBRATION

```

BA 100 REM -- DAMPED VIBRATION
--
CE 105 PRINT "{CLR}"
QH 110 PRINT "OUTPUT TO SCREEN
{SPACE}OR PRINTER (S/P)
{4 SPACES}S{3 LEFT}";:I
NPUTA$
KB 115 IF A$="S" THEN Z=1.33:Z
1=0:Z2=26.4:GOTO130:REM
VALUES FOR SCREEN OUTP
UT
BE 120 IF A$<>"P" THEN110
SC 125 Z=1.208:Z1=2.01:Z2=38.2
4:REM VALUES FOR PRINTE
R OUTPUT

```

```

QJ 130 SCREEN 1:HUE0,1
BE 135 WIPE
FJ 140 REM -- SET UP CONSTANTS
--
HS 145 REM -- XT AND YT SET X
{SPACE}AND Y AXES. XS A
ND YS SET START OF X AN
D Y AXES.
DG 150 REM -- EX AND EY ARE EX
PANSION FACTORS FOR X A
ND Y COORDINATES.
KB 155 XT=Z2:YT=100:XS=Z2:YS=0
:EX=10*Z:EY=1
GX 160 REM -- CALIBRATE X COOR
DINATES --
HM 165 FORX=XS TO 319 STEP 5*Z
KJ 170 Y=YT:PLOTX,Y:NEXTX
JF 175 FORX=XS TO 319 STEP 10*
Z
BP 180 FORY=YT-1 TO YT+1:PLOTX
,Y:NEXTX:NEXTX
XH 185 FORX=Z2 TO 319 STEP 50*
Z
XE 190 FORY=YT-2 TO YT+2:PLOTX
,Y:NEXTX:NEXTX
AE 195 REM -- CALIBRATE Y COOR
DINATES --
JB 200 FOR Y=YS TO 199 STEP 5
KP 205 X=XT:PLOTX,Y:NEXTX
BX 210 FOR Y=YS TO 199 STEP 10
RM 215 FOR X=XT-1 TO XT+1:PLOT
X,Y:NEXTX:NEXTX
EB 220 FOR Y=YS TO 199 STEP 50
FG 225 FOR X=XT-3 TO XT+3:PLOT
X,Y:NEXTX:NEXTX
AD 249 DF=5:REM --- DAMPING FA
CTOR --
CK 250 FOR X=.001 TO 20 STEP .
05
QB 260 Y=80*SIN(3*X)*EXP(-X/DF
)
MJ 270 X1=EX*X+Z2:Y1=EY*Y+YT:P
LOTX1,Y1:NEXTX
PQ 999 REM -- SCREEN OR HARDCO
PY --
GE 1000 GET A$:IF A$="" THEN10
00
JK 1010 PRINT "{CLR}":SCREEN 0
:PRINTCHR$(14)
RF 1020 PRINT"HARDCOPY (Y/N)
{4 SPACES}N{3 LEFT}";:I
NPUTA$:IF A$="N" THEN1
080
JR 1030 IFA$<>"Y"THEN1010
GF 1040 PRINT"SINGLE OR DOUBLE
WIDTH (S/D){4 SPACES}
S{3 LEFT}";:INPUA$
XB 1050 IFA$="S" THEN POKE2,1:
GOTO1070
KS 1060 POKE2,2:IFA$<>"D"THEN1
040
CR 1070 SCREEN 1:SYS52224
KS 1080 SCREEN 0:PRINTCHR$(14)
:LIST

```

Frank Gordon lives in Orono, Maine.

THE CUBE

By Michael J. Pope Jr.

If you like mind games, you'll love *The Cube*. The object of this simple but perplexing game is to move the 15 colored blocks to create the shape shown in the upper right-hand part of the screen.

Getting Started

The Cube is written entirely in BASIC. To avoid typing errors, use *The Automatic Proofreader*; see "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you exit *Proofreader*.

Playing the Game

When the game begins, you'll see four rows of colored blocks. All but one of the rows will contain four blocks. One row will contain a blank space. You'll see a gray frame around the first block; this frame represents your cursor. Use the cursor keys to move the frame from block to block.

To move the colored blocks around the screen, place your cursor on any block adjacent to the blank space and press f1. That block will move into the space that formerly was blank. (Diagonal moves are not allowed.) By moving blocks around in this fashion, you can eventually re-create the shape shown in the corner. To check your progress during the game, press f7. Press f7 at the end to see how many moves it took you to complete the puzzle.

THE CUBE

```

AS 0 CLR
EQ 10 REM COPYRIGHT 1992 - COM
    PUTE PUBLICATIONS INTL L
    TD - ALL RIGHTS RESERVED
CQ 60 PRINT "{CLR}":POKE53281,1
    :POKE53280,1
GR 70 R=0:PRINT "{8 SPACES}THE
    {SPACE}CUBE "
DQ 80 A=1138:B=55410:FORK=1TO4
    :READG:FOR T=1TO4:POKE A,
    160:POKEB,G:A=A+1:B=B+1
MG 90 NEXTT:A=A+36:B=B+36:NEXT
    K:POKE1141,32
RD 100 DIM A1(16):B1=1:TR=0
AG 210 R=R+1:K=INT(RND(0)*16+1
    ):IF A1(K)=0THEN T=T+
    {4 SPACES}READL:A1(K)=L
    :GOTO230
QQ 220 R=R-1:GOTO210
BX 230 IF R<16THEN210
RF 235 A=1105:C=55377:Z=1

```

```

JH 240 FORM=Z TOZ+3 :B=A:D=C
QS 250 FORK=1 TO4:FOR T=1 TO6:P
    OKED,A1(M):POKEB,160:B=
    B+1:D=D+1
CX 260 NEXT T:B=B+34:D=D+34:NE
    XT K:A=A+7 :C=C+ 7:NEXT
    M:A=B+19:C=D+19
SE 270 IFB>1690THENPRINT"
    {3 UP}":GOTO300
SK 280 Z=Z+4:GOTO240
BB 300 V=53248:POKE2040,13:FOR
    S=832TO832+62:READG:POK
    ES,G:NEXT
EF 310 POKEV+21,1:POKEV+39,15:
    POKEV,32:POKEV+1,60 :PO
    KEV+23,1:POKEV+29,1:X=3
    2:Y=60
JS 320 GET AS:IF AS="{UP}"AND
    {SPACE}Y>=100THEN Y=Y-4
    0:POKEV+1,Y:B1=B1-4: GO
    TO320
KR 330 IF AS="{DOWN}"AND Y<=14
    0THEN Y=Y+40:POKEV+1,Y:
    B1=B1+4: GOTO320
DH 340 IF AS="{RIGHT}"AND X<=1
    44THEN X=X+56:POKEV
    {2 SPACES},X:B1=B1+1: G
    OTO320
MM 350 IF AS="{LEFT}"AND X>=88
    THEN X=X-56:POKEV
    {2 SPACES},X:B1=B1-1:GO
    TO320
GD 360 IF AS="{F1}" THEN 400
GX 370 IF AS="{F7}" THEN 760
XP 380 GOTO320
GP 400 FORG=1TO16:IF A1(G)=1TH
    EN 420
EM 410 NEXT
DE 420 ON G GOTO 430,440,450,4
    60,470,480,490,500,510,
    520,530,540,550,560,570
    ,580
CE 430 IF B1=2 OR B1=5 THEN600
AS 435 GOTO320
SP 440 IF B1=1 OR B1=3 OR B1=6
    THEN600
EX 445 GOTO320
CH 450 IF B1=2 OR B1=4 OR B1=7
    THEN600
KA 455 GOTO320
JS 460 IF B1=3 ORB1=8 THEN600
RB 465 GOTO320
AS 470 IF B1=1 ORB1=6 ORB1=9 T
    HEN610
BB 475 GOTO320
ES 480 IF B1=5 ORB1=2 ORB1=7OR
    B1=10THEN610
FC 485 GOTO320
BF 490 IF B1=6 ORB1=3 ORB1=8OR
    B1=11THEN610
KD 495 GOTO320
FH 500 IF B1=7ORB1=4 ORB1=12TH
    EN610
AC 505 GOTO320
GS 510 IF B1=5 ORB1=10ORB1=13T
    HEN620
ED 515 GOTO320
JB 520 IF B1=9 ORB1=6ORB1=11OR

```

```

    B1=14THEN620
JE 525 GOTO320
BX 530 IF B1=10ORB1=7ORB1=12OR
    B1=15THEN620
QF 535 GOTO320
GQ 540 IF B1=11ORB1=8 ORB1=16T
    HEN620
AF 545 GOTO320
BA 550 IF B1=9 ORB1=14THEN630
EG 555 GOTO320
QF 560 IF B1=13ORB1=10ORB1=15T
    HEN630
JH 565 GOTO320
XB 570 IF B1=14ORB1=11ORB1=16T
    HEN630
QJ 575 GOTO320
EQ 580 IF B1=15ORB1=12THEN630
AJ 585 GOTO320
JB 600 IF G=1 THEN B=1105:D=55
    377:GOTO 640
MM 601 IF G=2 THEN B=1112:D=55
    384:GOTO 640
XB 602 IF G=3 THEN B=1119:D=55
    391:GOTO 640
RP 603 IF G=4 THEN B=1126:D=55
    398:GOTO 640
FK 610 IF G=5 THEN B=1305:D=55
    577:GOTO 640
GC 611 IF G=6 THEN B=1312:D=55
    584:GOTO 640
MK 612 IF G=7 THEN B=1319:D=55
    591:GOTO 640
KD 613 IF G=8 THEN B=1326:D=55
    598:GOTO 640
BB 620 IF G=9 THEN B=1505:D=55
    777:GOTO 640
SH 621 IF G=10THEN B=1512:D=55
    784:GOTO 640
JR 622 IF G=11THEN B=1519:D=55
    791:GOTO 640
RH 623 IF G=12THEN B=1526:D=55
    798:GOTO 640
CC 630 IF G=13THEN B=1705:D=55
    977:GOTO 640
DX 631 IF G=14THEN B=1712:D=55
    984:GOTO 640
QF 632 IF G=15THEN B=1719:D=55
    991:GOTO 640
CX 633 IF G=16THEN B=1726:D=55
    998:GOTO 640
HP 635 GOTO 320
SS 640 J=0:TR=TR+1
QS 650 J=J+1:FOR T=1 TO6:POKE
    D,A1(B1):POKEB,160:B=B+1:
    D=D+1:NEXTT
XM 660 B=B+34:D=D+34:IF J>3THE
    N 670
AX 661 GOTO650
SB 670 IFB1=1 THEN B=1105:D=55
    377:GOTO 710
RM 671 IFB1=2 THEN B=1112:D=55
    384:GOTO 710
JA 672 IFB1=3 THEN B=1119:D=55
    391:GOTO 710
MM 673 IFB1=4 THEN B=1126:D=55
    398:GOTO 710
DK 680 IFB1=5 THEN B=1305:D=55
    577:GOTO 710

```


PROGRAMS

```

BC 681 IFB1=6 THEN B=1312:D=55
      584:GOTO 710
RJ 682 IFB1=7 THEN B=1319:D=55
      591:GOTO 710
SC 683 IFB1=8 THEN B=1326:D=55
      598:GOTO 710
HB 690 IFB1=9 THEN B=1505:D=55
      777:GOTO 710
HP 691 IFB1=10 THEN B=1512:D=55
      784:GOTO 710
GR 692 IFB1=11 THEN B=1519:D=55
      791:GOTO 710
CJ 693 IFB1=12 THEN B=1526:D=55
      798:GOTO 710
CE 700 IFB1=13 THEN B=1705:D=55
      977:GOTO 710
SC 701 IFB1=14 THEN B=1712:D=55
      984:GOTO 710
BF 702 IFB1=15 THEN B=1719:D=55
      991:GOTO 710
PD 703 IFB1=16 THEN B=1726:D=55
      998:GOTO 710
GX 705 GOTO 320
XG 710 J=0
CX 720 J=J+1:FOR=1 TO 6:POKE,
      A1(G):POKEB,160:B=B+1:
      D=D+1:NEXTT
DJ 730 B=B+34:D=D+34:IF J>3THE
      N 750
FC 740 GOTO 720
KA 750 A1(0)=A1(B1):A1(B1)=A1(
      G):A1(G)=A1(0):G=B1:GOT
      O 320
XF 760 R=0:IF A1(1)=0 AND A1(2
      )=0 AND A1(3)=0 THEN R=
      R+1
QB 770 IF A1(5)=2 AND A1(6)=2
      {SPACE}AND A1(7)=2 AND
      {SPACE}A1(8)=2 THEN R=R
      +1
MQ 780 IF A1(9)=6 AND A1(10)=6
      AND A1(11)=6 AND A1(12
      )=6 THEN R=R+1
SQ 790 IF A1(13)=5 AND A1(14)=
      5 AND A1(15)=5 AND A1(1
      6)= 5{2 SPACES}THEN R=R
      +1
XG 800 IF R=4 THEN PRINT"
      {HOME}{21 DOWN}CONGRATU
      LATIONS IT ONLY TOOK YO
      U";
EE 810 IF R=4 THEN PRINT TR;"T
      IMES TO SOLVE THE PUZZL
      E":END
GQ 820 PRINT"{HOME}{22 DOWN} K
      EEP TRYING":FOR=1 TO 3
      0
AM 830 POKE209,0:POKE210,212:P
      OKE211,0:PRINT"0D HU{V}
      {RVS}{U}{OFF}@@@@@e<U
      @*@@@@@0";
RF 840 N=54296:NEXT:POKE,0:PR
      INT"{HOME}{22 DOWN}
      {12 SPACES}":GOTO 320
PX 850 REM *****
KM 860 REM "{RIGHT}" = RIGHT M
      OVEMENT
MK 870 REM "{LEFT}" = LEFT MOV

```

```

EMENT
RH 880 REM "{UP}" = UPWARD MOV
      EMENT
AC 890 REM "{DOWN}" = DOWNWARD
      MOVEMENT
HK 900 REM "{F1}" = SWITCHES T
      HE BLOCKS
PD 910 REM "{F7}" = CHECKS TO
      {SPACE}SEE IF PUZZLE IS
      SOLVED
SX 920 REM PROGRAM WRITTEN BY
      {SPACE}MICHAEL POPE
FC 930 REM *****
RG 1000 DATA 0,2,6,5,0,0,0,1,2
      ,2,2,2,6,6,6,6,5,5,5,5
      ,0,0,0,255,255,255
MR 1010 DATA 255,255,255,192,0
      ,3,192,0,3,192,0,3,192
      ,0,3,192,0,3,192,0,3,1
      92,0,3
JM 1020 DATA 192,0,3,192,0,3,1
      92,0,3,192,0,3,192,0,3
      ,192,0,3,192,0,3,192,0
      ,3
AQ 1030 DATA 192,0,3,255,255,2
      55,255,255,255

```

Michael J. Pope Jr. lives in Raleigh, North Carolina.

GEOLYNX For C-128

By Stephen Van Egmond

Telecommunication has revolutionized computers. We can send electronic mail across the country at the push of a button; we can chat with hundreds of other people; and we can get to know people without ever seeing their faces.

For some time now, GEOS and telecommunication haven't merged well because of GEOS' new file format. I imagine that some people have attempted to transfer a GEOS file and have been surprised by the fact that most or all of the file has disappeared.

GeoLynx converts GEOS files so that they can be sent via modem. It doesn't combine files, as the name would seem to imply. I thought it best to leave that to the other programs made to do this, such as *Archive*, *LHArchive*, and the like, rather than make my own compression routine.

The files that *geoLynx* creates are only one block longer than the original ones, and the program works with either SEQ or VLIR (Variable Length Indexed Record) files. The program can't be used for sending applications by modem for the purposes of pirating because of the GEOS serial number copy protection.

Getting Started

GeoLynx is written entirely in machine language. To type it in, use *MLX*, our machine language entry program; see "Typing Aids" elsewhere in this section. When *MLX* prompts, respond with the following values.

Starting address: 0247

Ending address: 1526

After you've typed in the program, be sure to save it before you exit *MLX*. Next, you'll have to convert the program so it will run under *GEOS*. To do that, you'll need a copy of *geoConverter*. *GEOS* users may already have a copy of this utility since we have published it before. You can also find a copy on Gazette's *GEOS Collection* disk. A copy of the program is printed below. It is written entirely in BASIC. To help avoid typing errors, enter it with *The Automatic Proofreader*. See "Typing Aids" again.

When you have both programs on disk, run *geoConverter*. When it asks for a file name to convert to *GEOS* format, give it the filename you used to save *geoLynx*. It will then copy the program and convert it into a file that *GEOS* will recognize. Your new *geoLynx* file will then be ready to use when you boot *GEOS*.

Using the Program

GeoLynx works with any model floppy drive that works with *GEOS*. I don't know of its performance on the CMD HD series, but I suspect that CMD knew what it was doing when it made its hard drive 100 percent compatible with *GEOS*. *GeoLynx* allows you to enter a description for each file that you pack and displays this description while it's unpacking the file.

After running the program from the deskTop, you are presented with a colored screen with three options: Pack, Unpack, and Quit. The screen is divided into several areas. The middle of the screen is your main work area. Here, you will highlight your files and select different icons to do different tasks. At the bottom left of the screen is an information area that gives you statistics on how *geoLynx* is progressing through your files.

The Quit option takes you back to

the deskTop on the most recently accessed drive. Pack converts a *GEOS* file into a Commodore file. Unpack does the reverse, converting files from Commodore to *GEOS*.

Selecting Files

After selecting your desired option, you're presented with the files to choose from. If you decide to pack a *GEOS* file, the program will load a list of all the *USR* files on the drive. Since all *GEOS* files are of the *USR* type, you should have no problems. If you decide to unpack files, the directory will be loaded, and all the *PRG* files will be searched for a special *geoLynx* flag in the first block. All files that match this search are listed, and those that don't match are rejected. Only files eligible to be unpacked will be listed; your ordinary files are at no risk, unless they should contain the *geoLynx* flag.

One problem which may result with the Pack routine is that while all *GEOS* files are *USR*, not all *USR* files are *GEOS*. If you should, by chance, happen to pack a *USR* file that isn't a *GEOS* file, then *geoLynx* might complain; if it doesn't, then your program has all the looks of a *GEOS* file.

The current disk name and the amount of room available are displayed in the top window. To select the files you wish to work with, simply click on the needed files in the selection window, toggling them on and off. The window doesn't display all the files. To see more, use the up and down arrows. To cancel your Pack or Unpack choice, use the Cancel icon to return to the initial dialog box.

To move to another drive, use the Drive icon. *GeoLynx* cycles sequentially through the drives that you have connected. To work with another disk, click on the Disk icon, insert a new disk in the current drive, and click on OK.

To have *geoLynx* start work on your files, click on the Go! icon. If you are packing files, you will be prompted to enter a description for the files you highlighted. If you click on Yes, *geoLynx* will pause at the beginning of each file and allow you to enter a text description of it. Enter the description and press Return. If you click on No, *geoLynx* will place the description "Not giv-

en" in each of the files. If you are unpacking the files, *geoLynx* will get to work right away, displaying the description of each new file it works on.

When the operation is complete, you are returned to the Pack/Unpack/Quit dialog box. One final note about the packing operations. For the filename, *GEOS* uses standard ASCII, and the 64/128 uses Commodore ASCII. Standard ASCII lowercase characters can't be accessed when the computer is using Commodore ASCII. To make your life easier, *geoLynx* converts all the characters into *GEOS* uppercase characters, which are considered lowercase in Commodore ASCII.

Disk Errors

Under normal conditions, *geoLynx* will perform without a hitch. The program checks for disk errors whenever it attempts to write a block to the disk, but it doesn't bother when reading. If a disk error occurs, the entire operation is aborted, all the files are deselected, and you are shown what the *GEOS* Kernel thinks the error is. If the error occurred in a file, then the file is probably corrupt. If you have a disk editor, you may be able to recover the file; refer to the next section for more information on the file format.

File Format

GEOS supports Sequential and VLIR file formats. *GeoLynx* doesn't care which one you are working with. The only difference between the two is that the Sequential files are processed with *geoLynx* considerably faster than VLIR, because every single block of the VLIR file must be visited for accurate information. What follows is a description of what *geoLynx* does to each file type and what's located where.

Sequential File Format

Block Index Description

1		<i>GeoLynx</i> information block, null-filled except for:
1-2		Pointer to next block.
3-31		Original directory entry of file.
64-73		<i>GeoLynx</i> indicator.
128-		Variable length file description.

2		Original header block.
1-2		Pointer to first block of the actual program.
3-		The complete <i>GEOS</i> program.

VLIR File Format

Block Index Description

1		<i>GeoLynx</i> information block, null-filled except for:
0-1		Pointer to next block.
2-30		Original directory entry of file.
63-72		<i>GeoLynx</i> indicator.
127-		Variable length file description.
2		Original header block.
0-1		Pointer to VLIR record information block.
3		Block with detailed info about records; null except:
0-1		Pointer to first block of first used VLIR record.
2N		Length, in blocks, of record #N.
2N+1		Number of bytes in last block of record #N.
4-		The complete file, with each VLIR record chained one after the other.

From the above table, it's obvious that the *GEOS* Sequential files are not guaranteed to be the exact length after transmission over the modem because of padding brought in by such protocols as XMODEM. Thus, if your files seem to grow by up to 128 bytes each time you transmit them, try a decent protocol or terminal program.

GEOLYNX

```

0247:5F 03 15 BF 00 00 00 7D D7
024F:FF F8 47 30 CC 6E D7 B4 02
0257:2E F7 B4 2E F1 B4 2E 97 40
025F:B4 2E D7 B4 2F 30 CC 2F 92
0267:FE FE 2E 6A 6A 2F AD B6 B9
026F:6E AD B6 40 89 2A 7F EF D4
0277:FE 00 E8 26 00 9B FA 00 DE
027F:F2 B6 00 02 2E 00 03 62 A4
0287:00 01 FE 83 06 00 00 04 18
028F:FE 03 00 04 67 65 6F 4C 90
0297:79 6E 78 5F 05 00 20 56 B7
029F:32 2E 30 00 00 00 00 53 A1
02A7:74 65 70 68 65 6E 20 56 4F
02AF:61 6E 20 45 67 6D 6F 6E 96

```


PROGRAMS

```

02B7:64 5F 2D 00 00 43 6F 6E C5 04E7:91 0E C8 C0 13 D0 F7 A9 D6 0717:FF 81 3F 05 FF 0C BF D3 41
02BF:76 65 72 74 20 66 69 6C C7 04EF:00 91 0E 18 A9 11 65 0E 0A 071F:07 00 04 06 10 C0 08 05 2A
02C7:65 73 20 66 6F 72 20 6D B8 04F7:85 0E 90 02 E6 0F EE F1 BB 0727:FF 82 FE 80 04 00 82 02 E4
02CF:6F 64 65 6D 20 74 72 61 41 04FF:1B D0 03 EE F2 1B 18 A9 F6 072F:80 04 00 BE 03 80 07 C0 53
02D7:6E 73 6D 69 73 73 69 6F DF 0507:02 65 FD 85 FD 90 02 E6 A0 0737:0C C0 03 80 0C 60 00 C0 86
02DF:6E 2E 20 42 61 74 63 68 DA 050F:FE 20 33 90 20 09 15 F0 50 073F:03 80 0C 6C DD E0 03 80 30
02E7:20 6F 70 74 69 6F 6E 2E 41 0517:03 4C AC 04 A5 0D C9 80 01 0747:0C 6C CC C0 03 80 0C 6C BA
02EF:5F 2D 00 00 A9 00 8D B5 0D 051F:F0 AA AD 37 16 D0 03 4C BB 074F:CC C0 03 80 0C 6C CC C0 C8
02F7:84 A9 35 85 01 AD 20 D0 77 0527:D4 06 A9 17 85 FC A9 3D 74 0757:03 80 0C 6C CC C0 03 80 3F
02FF:8D 35 16 A9 0B 8D 20 D0 15 052F:85 FB A9 80 85 0B 85 19 B4 075F:0D ED CC C0 03 80 07 C7 05
0307:AD 27 D0 8D 36 16 A9 04 02 0537:A9 40 85 18 A9 13 85 15 12 0767:CC 70 03 80 00 60 00 00 E1
030F:8D 27 D0 A9 30 85 01 A9 9D 053F:A9 89 85 14 A9 00 85 0A D4 076F:03 80 04 00 81 03 06 FF C3
0317:FF 85 30 A9 8C 85 05 A9 4D 0547:85 FD 85 FE 85 16 85 17 DA 0777:81 3F 05 FF 0C BF 33 08 84
031F:00 85 04 A9 0B A2 27 A0 73 054F:A9 F3 85 10 85 12 A9 1B BF 077F:00 04 06 10 8F 0D 61 20 E3
0327:18 20 4E 0D A9 8C 85 05 6B 0557:85 11 85 13 A0 00 B1 FB AE 0787:47 45 4F 53 20 66 69 6C 83
032F:A9 29 85 04 A9 0D A2 25 31 055F:85 04 C8 B1 FB 85 05 20 81 078F:65 2E 00 61 20 43 6F 6D 4C
0337:A0 0E 20 4E 0D A9 8E 85 AB 0567:E4 C1 A2 14 A0 18 20 6B FA 0797:6D 6F 64 6F 72 65 20 66 8B
033F:05 A9 A9 85 04 A9 0A A2 3D 056F:C2 D0 18 A2 12 A0 10 20 8F 079F:69 6C 65 2E 00 74 6F 20 DD
0347:15 A0 06 20 4E 0D A9 8E 4B 0577:88 C2 18 A9 11 65 10 85 C7 07A7:64 65 73 80 54 6F 70 2E D5
034F:85 05 A9 C0 85 04 A9 DE 09 057F:10 90 02 E6 11 E6 16 D0 85 07AF:00 A9 00 1C A9 01 8D 37 8D
0357:A2 0E A0 06 20 4E 0D 20 1B 0587:02 E6 17 18 A9 11 65 12 1F 07B7:16 4C BF C2 81 13 32 0D D1
035F:A8 C1 05 00 01 00 00 00 D2 058F:85 12 90 02 E6 13 18 A9 70 07BF:0B 05 11 D8 08 0B 05 1F D9
0367:03 3F 01 C7 05 01 01 0C 95 0597:02 65 FB 85 FB 90 02 E6 E0 07C7:F9 08 0E 00 18 50 6C 65 D6
036F:00 0C 03 3B 01 84 01 0C B4 059F:FC E6 FD D0 02 E6 FE A5 FD 07CF:61 73 65 20 69 6E 73 65 6B
0377:00 8C 03 3C 00 C4 01 C4 A6 05A7:FE CD F2 1B D0 05 A5 FD 98 07D7:72 74 20 61 20 6E 65 77 53
037F:00 8C 03 3B 01 C4 01 08 E1 05AF:CD F1 1B 90 A7 A5 17 8D 19 07DF:20 64 69 73 6B 20 69 6E 98
0387:00 08 07 37 01 80 01 08 F7 05B7:F2 1B A5 16 8D F1 1B A0 23 07E7:20 74 68 65 00 64 72 69 66
038F:00 88 07 B8 00 C0 00 20 47 05BF:40 A9 00 91 10 88 10 FB 2C 07EF:76 65 20 61 6E 64 20 63 55
0397:AB C1 1C 0B 18 88 0F 38 51 05C7:A0 00 85 20 8D 39 16 8D 64 07F7:6C 69 63 6B 20 74 68 65 C2
039F:20 A8 C1 05 00 01 09 00 7E 05CF:3A 16 A9 1B 85 FC A9 F3 CA 07FF:20 6D 6F 75 73 65 20 62 92
03A7:09 03 36 01 7F 01 09 00 DB 05D7:85 FB A9 00 85 19 A9 18 D4 0807:75 74 74 6F 6E 2E 00 81 22
03AF:89 03 B7 00 BF 06 0B 00 5E 05DF:85 18 A5 20 C9 0F 23 CC 080F:13 32 0D 0B 05 15 30 09 6D
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0957:D8	F3 B6 CC E3 B6 C6 F3 F1	0B87:82	01 80 0D 00 9A 01 81 ED	0DB7:99	10 6F 99 50 70 88 C0 40
095F:BC	DC DB 80 00 03 80 00 97	0B8F:E0	00 0C 00 00 0C C0 00 49	0DBF:FF	D0 F5 A5 FB 18 69 33 6D
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096F:FF	FF 06 BF B8 FF FF FF 04	0B9F:00	0C 00 00 0C C0 00 66 22	0DCF:A9	6B 85 05 A9 00 85 19 0C
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09B7:FF	FE 80 00 02 80 00 03 AE	0BE7:83	C6 7B CD 9E D8 03 0F 2B	0E17:85	06 A9 27 85 07 A9 20 DA
09BF:80	00 03 8F 00 63 99 80 AC	0BEF:6C	07 9E DB 3C D9 E1 80 1D	0E1F:85	08 A9 2F 85 0A A9 00 CF
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09EF:82	00 8A 01 96 00 16 03 88	0C1F:83	BE BE BE 29 0E A9 8C CD	0E4F:D0	03 4C 0C 10 A9 AD 85 E6
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0A07:FC	00 24 03 22 01 16 00 8F	0C37:0D	8D 0C 8C A9 0B 8D 88 37	0E67:BF	B1 02 91 04 88 C0 FF EC
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0ABF:00	C1 DC 01 81 C0 1B 80 B5	0CEF:20	B3 C2 C9 00 F0 41 A5 E5	0F1F:1B	D0 01 60 AD F1 1B 18 A8
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0ACF:C3	8E 01 81 FF FB FF E7 79	0CFE:E9	02 48 CD F1 1B 90 03 93	0F2F:69	1A 8D F2 1B AD 37 16 7D
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0B07:80	00 C0 05 00 8A 01 E0 D2	0D37:60	A9 18 85 06 A9 27 85 F1	0F67:64	65 73 63 72 69 70 74 44
0B0F:C1	80 00 61 81 80 01 C0 0D	0D3F:07	A9 20 85 08 A9 2F 85 6E	0F6F:69	6F 6E 3A 0F 00 A9 1B 76
0B17:05	00 8A 03 C0 01 80 00 3C	0D47:0A	A9 00 85 09 85 0B 20 BD	0F77:85	FC A9 E2 85 FB A9 1A 84
0B1F:61	81 80 03 80 05 00 8A 29	0D4F:2A	C1 AD 39 16 18 69 04 20	0F7F:85	FE A9 5C 85 FD 18 A9 19
0B27:1F	80 7F 00 00 61 81 87 EC	0D57:AA	AD 3A 16 69 00 CD F2 B4	0F87:11	65 FB 85 FB 90 02 E6 6C
0B2F:FF	3F 05 FF 8A FE 00 C0 C6	0D5F:1B	D0 08 EC F1 1B 90 03 2B	0F8F:FC	E6 FD D0 02 E6 FE A0 FC
0B37:00	E0 61 81 8F FC 7F 05 3E	0D67:4C	1E 0F A9 A7 85 03 A9 AE	0F97:00	B1 FD D0 1F A5 FE CD 4A
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PROGRAMS

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0FF7:85 19 A9 61 85 18 A9 C0 0B
0FFF:20 84 C1 A9 B8 85 05 A9 B1
1007:00 85 19 A9 24 85 18 A5 53
100F:FC 85 03 A5 FB 85 02 20 E3
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1027:84 A9 FF 99 01 81 A5 FC E3
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1037:16 D0 03 4C 82 11 4C 9C 49
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1047:02 20 36 C1 4C AC 04 A9 1A
104F:08 85 03 A9 C8 85 02 20 50
1057:56 C2 20 73 0D 4C 37 05 9B
105F:AE 89 84 8A E8 38 E9 07 75
1067:CD 8D 84 D0 02 A2 08 8A A4
106F:20 B0 C2 4C 37 05 A5 0F 11
1077:8D 31 16 A5 0E 8D 30 16 E4
107F:AD FF 00 D0 5D 20 A8 C1 02
1087:05 00 01 09 00 09 03 36 3B
108F:01 7F 06 14 00 1E 0E 45 EB
1097:6E 74 65 72 20 64 65 73 B0
109F:63 72 69 70 74 69 6F 6E D8
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10CF:A9 F9 8D A3 84 A9 01 8D 89
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10E7:BB 16 88 10 F7 AD 31 16 6C
10EF:85 0F AD 30 16 85 0E 20 52
10F7:0B C2 20 09 15 F0 03 4C A1
10FF:AC 04 AD 14 84 85 09 AD 68
1107:13 84 85 08 20 92 C2 20 F5
110F:09 15 F0 03 4C AC 04 A0 07
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111F:91 0C C8 A5 09 91 0C C8 EF
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112F:90 04 E9 20 91 0C C8 C0 E8
1137:13 D0 ED A9 00 91 0C C8 96
113F:C0 1C 90 F9 B1 0C 69 00 0B
1147:91 0C C8 B1 0C 69 00 91 01
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1157:03 4C AC 04 A5 09 85 05 45
115F:A5 08 85 04 A9 16 85 0B 03
1167:A9 3B 85 0A A0 12 B9 89 C8
116F:13 99 7B 16 88 10 F7 A0 67
1177:1D B9 00 84 99 3D 16 88 55
117F:10 F7 AD 14 84 8D 3C 16 87
1187:AD 13 84 8D 3B 16 20 E7 09
118F:C1 20 09 15 F0 03 4C AC E5
1197:04 AD 14 84 85 05 AD 13 A0
119F:84 85 04 A9 80 85 0B A9 5A
11A7:00 85 0A 20 E4 C1 AD 02 F9
11AF:84 8D 01 80 AD 01 84 8D A7
11B7:00 80 20 E7 C1 20 09 15 32
11BF:F0 03 4C AC 04 20 4A C2 67
11C7:20 09 15 F0 03 4C AC 04 94
11CF:AD 15 84 D0 03 4C 92 10 2A
11D7:AD 02 84 85 05 AD 01 84 9F
11DF:85 04 A9 16 85 0B A9 3B 43
11E7:85 0A 20 E4 C1 A9 80 85 DC
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11F7:99 00 81 88 D0 FA AE 96 06
11FF:84 E8 E8 F0 4D 8E 96 84 21

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121F:80 BD 3C 16 8D 01 80 20 6D
1227:E7 C1 20 09 15 F0 03 4C 03
122F:AC 04 AD 00 80 85 04 AD 30
1237:01 80 85 05 20 E4 C1 AE C3
123F:96 84 FE 00 81 AD 00 80 F2
1247:D0 EB AD 01 80 9D 01 81 92
124F:D0 AC AD 02 84 85 05 AD CE
1257:01 84 85 04 A9 81 85 0B 77
125F:A9 00 85 0A 20 E7 C1 20 ED
1267:09 15 F0 03 4C AC 04 4C 0D
126F:92 10 4E 6F 74 20 67 69 FD
1277:76 65 6E 2E 00 67 65 6F B8
127F:4C 79 6E 78 20 66 6F 72 69
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1327:8E 3B 16 C8 A8 3C 16 20 84
132F:E7 C1 68 85 04 68 85 05 F0
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133F:AC 04 A9 80 85 0B A9 00 A5
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134F:F0 05 68 68 4C AC 04 AD 8D
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136F:0A 20 E4 C1 AD 3C 16 8D 73
1377:01 80 AD 3B 16 8D 00 80 0F
137F:A9 80 85 0B A9 00 85 0A 5E
1387:AE 96 84 E8 E8 F0 51 8E 06
138F:96 84 BD 3B 16 F0 F1 AD 93
1397:00 80 9D 00 81 AD 01 80 D6
139F:9D 01 81 AD 01 80 85 05 F9
13A7:AD 00 80 85 04 20 E4 C1 39
13AF:AE 96 84 E8 3B 16 D0 EB 11
13B7:AD 01 80 48 AD 00 80 48 40
13BF:BD 3C 16 8D 01 80 A9 00 CC
13C7:8D 00 80 20 E7 C1 F0 05 F3
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13F7:AC 04 4C 92 10 E0 00 0D FC
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1407:12 0A AA BD 4F 15 8D 3D 13
140F:15 BD 50 15 8D 3E 15 A9 C5
1417:15 85 03 A9 31 85 02 20 E9
141F:56 C2 4C 73 0D 81 13 32 AA
1427:0D 0B 0B 13 43 15 0B 0B BA
142F:24 00 00 01 11 49 00 18 3F

```

```

1437:44 69 73 6B 20 45 72 72 6E
143F:6F 72 20 3A 00 89 15 89 3D
1447:15 98 15 B0 15 B0 15 C0 24
144F:15 D8 15 D8 15 D8 15 D8 77
1457:15 D8 15 D8 15 D8 15 F8 9F
145F:15 EA 15 F8 15 F8 15 F8 AE
1467:15 F8 15 0C 16 F8 15 F8 73
146F:15 1E 16 F8 15 F8 15 F8 AB
1477:15 F8 15 F8 15 49 6E 76 BB
147F:61 6C 69 64 20 74 72 61 FF
1487:63 6B 2E 00 49 6E 73 75 62
148F:66 66 69 63 69 65 6E 74 1A
1497:20 64 69 73 6B 20 73 70 80
149F:61 63 65 2E 46 69 6C 65 F6
14A7:20 6E 6F 74 20 66 6F 75 9F
14AF:6E 64 2E 00 42 61 64 20 6E
14B7:42 41 4D 2E 20 56 61 6C 67
14BF:69 64 61 74 65 20 64 69 07
14C7:73 6B 2E 00 44 65 76 69 58
14CF:63 65 20 6E 6F 74 20 66 E1
14D7:6F 75 6E 64 2E 00 4D 69 9E
14DF:73 73 69 6E 67 20 64 69 A0
14E7:73 6B 2E 00 42 6C 6F 63 70
14EF:6B 20 61 63 63 65 73 73 43
14F7:20 65 72 72 6F 72 2E 00 A0
14FF:57 72 69 74 65 20 70 72 E3
1507:6F 74 65 63 74 20 6F 6E 5A
150F:2E 00 44 69 73 6B 20 49 42
1517:44 20 6D 69 73 6D 61 74 38
151F:63 68 2E 00 00 00 00 00 DA

```

GEOCONVERTER 2.0

```

DS 10 REM COPYRIGHT 1992 COMPU
TE! PUBLICATIONS, INC. -
ALL RIGHTS RESERVED
SE 20 IF(PEEK(772)+PEEK(773)*2
56)=42364THEN40
PD 30 LIST0,1:LIST4,1:LIST6,1:
SA=PEEK(4625)*256+PEEK(4
624):GOTO50
SX 40 POKE56,PEEK(46)+40:CLR:P
OKE53280,0:POKE53281,0:S
A=PEEK(56)*256+PEEK(55)
RP 50 PRINT"{CLR}{8}{N}{DOWN}"
TAB(12)"{RVS}GEOCONVERTE
R 2.0{OFF}{GRN}{3 DOWN}"
:PRINTTAB(13)"COPYRIGHT
{SPACE}1990{DOWN}"
KR 60 PRINTTAB(7)"COMPUTE! PUB
LICATIONS INC.{DOWN}":PR
INTTAB(11)"ALL RIGHTS RE
SERVED{2 DOWN}"
MK 70 N=8:PRINT"DRIVE NUMBER "
N"{4 LEFT}";:INPUTN:IFN<
8ORN>11THEN70
QE 80 K$="N":PRINT"IS DRIVE"N
A 1581?"K$"{3 LEFT}";:I
NPUTK$:IFK$<>"N"ANDK$<>"
Y"THEN80
SB 90 T$=CHR$(18):S$=CHR$(1):I
FK$="Y"THENT$=CHR$(40):S
$=CHR$(3)
RS 100 INPUT"FILE TO CONVERT";
NM$:OPEN15,N,15:OPEN1,N
,8,"O":"+NM$+",P,R"
BX 110 GOSUB440:IFEN<>0THENPRI
NT"{RVS}"EN$"EM$SET$EE
$:GOTO400

```



```

FF 120 GET#1,K$,V$:IFK$<>CHR$(
71)ORV$<>CHR$(2)THENCLO
SE1:CLOSE15:GOTO220
BR 130 PRINT"{DOWN}DECOMPRESSI
NG...":Z$=CHR$(0):GET#1
,ESC$:ESC=ASC(ESC$+Z$):
AD=SA
RQ 140 GOSUB170:IFV$<>ESCTHENPO
KEAD,V:AD=AD+1:GOTO140
PP 150 GOSUB170:CT=V:GOSUB170:
CT=CT+V*256:GOSUB170:GO
SUB160:GOTO140
DH 160 FORI=1TOCT:POKEAD,V:AD=
AD+1:NEXTI:CT=0:RETURN
PK 170 GET#1,V$:S=ST:V=ASC(V$+
Z$):IFST=0THENRETURN
SJ 180 IFS<>64THENGOSUB440:PRI
NT"{DOWN}LOAD ERROR -
{RVS}"EN$ "EM$ETSEE$:G
OTO400
AF 190 IFCT<>0THENGOSUB160:AD=
AD-1
DG 200 PRINT"{DOWN}WRITING..."
:CLOSE1:PRINT#15,"S0:"+
NM$:CLOSE15
EF 210 OPEN1,N,8,"0:"+NM$+"P,
W":FORI=SATOAD:PRINT#1,
CHR$(PEEK(I)):NEXTI:CL
OSE1
GP 220 PRINT"{DOWN}CONVERTING.
...":HD$="":FORI=1TO4:RE
ADHE:HD$=HD$+CHR$(HE):N
EXTI
CF 230 FORI=1TO5:READIE:ID$=ID
$+CHR$(IE):NEXTI
DR 240 NL$="":OPEN15,N,15,"I0:
":OPEN2,N,2,"#"
MM 250 GOSUB410:GET #2,NT$,NS$
:FORI=0TO7:D$=NL$:GET#2
,B$:I=1:IFB$=NL$THEN310
PE 260 IF ASC(B$)<>130 THEN310
AE 270 GET#2,HT$,HS$:I=3:IFHS$
="":THENHS$=CHR$(0)
DJ 280 GET#2,B$:I=I+1:IFB$="":T
HENB$=CHR$(0)
BM 290 IF(ASC(B$)=160)OR(I=19)
THEN310
SF 300 D$=D$+B$:GOTO280
EB 310 FORI=1TO31:GET#2,B$:NEX
TI:IFD$=NM$THEN340
JX 320 NEXTE:IFNT$=NL$THEN340
CH 330 T$=NT$:S$=NS$:GOTO250
GA 340 IFD$=NL$THENPRINT"
{DOWN}DISK ERROR!":GOTO
400
PD 350 DT$=T$:SS$=S$:T$=HT$:S$
=HS$:GOSUB410:GET#2,MT$,
MS$:IFMS$="":THENMS$=CH
R$(0)
GF 360 FORI=0TO65:GET#2,B$:NEX
TI:GET#2,CT$,GT$:GOSUB4
10:PRINT#2,HD$:GOSUB42
0
RX 370 T$=DT$:S$=SS$:GOSUB410:
FORI=1TO32*E+2:GET#2,B$
:NEXTI:PRINT#2,CT$,MT$,
MS$;
MB 380 FORI=0TO15:GET#2,B$:NEX

```

```

TI:PRINT#2,HT$,HS$:CHR$
(0);GT$:ID$:GOSUB420
GR 390 PRINTNM$:CONVERTED!"
HB 400 CLOSE1:CLOSE2:CLOSE15:E
ND
DQ 410 U$="U1":GOTO430
CS 420 U$="U2"
PA 430 PRINT#15,U$;2;0;ASC(T$+
"0");ASC(S$+"0"):RETURN
JJ 440 INPUT#15,EN,EM$,ET,EE:E
N$=STR$(EN):ET$=STR$(ET
):EE$=STR$(EE):RETURN
EH 450 DATA 0,255,3,21,87,10,1
,0,0

```

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HAG

By Bruce M. Bowden

HAG, which stands for High-resolution Animation Generator, lets you quickly create your own movies with the 64.

HAG combines a set of individual images into an animated sequence or, in other words, combines bitmapped pictures into a movie. The images must be two color and high resolution like those produced by programs such as *The Printshop*, *WorldMap 64*, and *WorldMap 128* (October 1991 *Gazette Disk* bonus). *LI-SA*, the Little Isometric Artist (January 1992), will also generate images of this type.

To use the images, place them on the same disk and name them *SLIDExx*, where *xx* is a two-digit number. The images must be numbered in the desired order: *SLIDE00*, *SLIDE01*, *SLIDE02*, for example. The numbering, however, may begin anywhere.

Getting Started

HAG is written entirely in machine language. Use *MLX*, our machine language entry program, to enter it. See "Typing Aids" elsewhere in this issue. When *MLX* prompts, respond with the following values.

Starting address: 0801

Ending address: 15F8

Be sure to save a copy of the program before exiting *MLX*.

Making Movies

To run *HAG*, load and run it like a BASIC program. The first prompt asks you

to place a disk containing your set of images in the disk drive 8. It then asks for a starting number, 01-99. An ending number is entered the same way.

Next, you are asked how you want the movie to run. Do you want a straight run from the first image to the last? Or do you want it to oscillate from start to finish and then back down to start? Press S for a straight run or O to oscillate. The graphic screen will appear after this selection, and you can watch as the first image is loaded. After loading, a new text screen will appear for selecting colors. Press a key to return to the picture, and choose suitable background and foreground colors by pressing the 1 (background) or 2 (foreground) keys. After you've made your selections, press Return, and the slides will be loaded, compressed, and merged one by one. The screen is updated as each new slide is appended.

After all of the slides have been loaded, a prompt will appear on the text screen, asking you to insert the disk upon which you wish to save the movie and to enter the movie name. You can abort the process by entering a percent (%) symbol. If you abort the save, you can still run the movie by entering SYS 16384. Vary the speed of the movie with POKE 16384+3, x, with x being any value between 1 and 255.

Showing a Movie

You can load a saved movie to the same location, 16384 (\$4000), with LOAD "filename",8,1. The advantage of this arrangement is that it allows you to run movies from within a small BASIC or machine language program under the movie data. It may be as simple as 10 SYS 16384:GOTO 10 or as complicated as something that loads several movies and varies the speed according to user input. Each time a movie is run, control is returned to the calling routine. That's the reason for the iterative example above.

If necessary, the calling routine must also recover text mode. This is done, from BASIC, with these three pokes:

POKE 53265,PEEK(53265) AND 223
POKE 53272,(PEEK(53272) AND 260) OR 6
POKE 53270,PEEK(53270) AND 239

PROGRAMS

Pressing Run/Stop-Restore also recovers from the graphics mode without disturbing the movie code.

If the storage required for the movie exceeds the 64's available memory, loading will stop with a message saying so. In that case, the generator program must be reloaded and an alternative series of images loaded. Choosing a sequential run over an oscillating one will also conserve memory.

Memory Locations

The loader code resides from addresses 16384 (\$4000) to 16806 (\$41A6), and the movie data is stored from 16807 (\$41A7) to a maximum address of 53247 (\$CFFF). This is 142 blocks, more than 36K of movie storage. The rate of speed at which the movie is run is stored in 16387 (\$4003) and has a default value which is normally adequate. Background and foreground defaults may also be modified by poking the colors to 16390 and 16393 respectively.

Any BASIC program using the movie must set a ceiling for storage at 16384 (\$4000). This is done with POKE 55,254:POKE 56,63:CLR.

HAG

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 4C F7 08 93 97
0811:0D 0D 0E 05 20 20 20 76
0819:20 20 73 61 76 65 20 4F 9E
0821:50 45 52 41 54 49 4F 4E BD
0829:53 20 41 52 45 20 63 61 0B
0831:6E 63 65 6C 6C 65 64 0D 93
0839:0D 74 48 45 20 4D 4F 56 75
0841:49 45 20 52 45 4D 41 49 9B
0849:4E 53 20 49 4E 20 4D 45 C0
0851:4D 4F 52 59 20 46 4F 52 C6
0859:20 52 55 4E 4E 49 4E 47 19
0861:0D 20 20 20 20 20 20 20 E7
0869:6A 55 53 54 20 73 79 73 E8
0871:20 54 4F 20 31 36 33 38 93
0879:34 20 28 24 34 30 30 30 E5
0881:29 2E 0D 20 20 20 20 20 37
0889:70 4F 4B 45 20 54 4F 20 74
0891:31 36 33 38 34 2B 33 20 86
0899:54 4F 20 56 41 52 59 20 37
08A1:53 50 45 45 44 2E 0D 0D 6E
08A9:20 20 20 63 4F 4E 54 52 BA
08B1:4F 4C 20 49 53 20 52 45 1A
08B9:54 55 52 4E 45 44 20 54 48
08C1:4F 20 54 48 45 20 43 41 03
08C9:4C 4C 49 4E 47 0D 20 20 EF
08D1:20 20 52 4F 55 54 49 4E 16
08D9:45 20 41 54 20 54 48 45 2A
08E1:20 45 4E 44 20 4F 46 20 4C
08E9:4F 4E 45 20 43 59 43 4C 32
08F1:45 2E 0D 00 00 00 A9 14 39
08F9:85 FC A9 4B 85 FB A9 40 A5
0901:85 FE A9 00 85 FD A2 15 49
```

```
0909:A0 F2 20 4F 0B 4C 32 12 21
0911:00 00 00 00 53 4C 49 44 C5
0919:45 30 30 30 30 30 31 20 A7
0921:D5 40 20 1C 41 A9 15 85 54
0929:FB A9 09 85 FC A9 0F A2 6C
0931:08 A0 00 20 BA FF A9 07 A1
0939:A6 FB A4 FC 20 BD FF A9 A3
0941:00 A2 00 A0 20 20 D5 FF 33
0949:60 AD 14 09 D0 03 4C 8A BF
0951:09 C9 AA D0 19 20 AA 09 64
0959:AD 1B 09 CD 1D 09 D0 0B C0
0961:AD 1A 09 CD 1C 09 D0 03 78
0969:4C A0 09 4C D2 09 AD 1B E0
0971:09 CD 1F 09 D0 23 AD 1A 78
0979:09 CD 1E 09 D0 1B A9 AA C8
0981:BD 14 09 20 AA 09 4C D2 67
0989:09 AD 1B 09 CD 1F 09 D0 4D
0991:08 AD 1A 09 CD 1E 09 F0 D0
0999:06 20 BE 09 4C 6C 09 A5 EA
09A1:01 09 03 85 01 58 4C 06 37
09A9:0C AD 1B 09 C9 30 F0 04 16
09B1:CE 1B 09 60 A9 39 8D 1B 81
09B9:09 CE 1A 09 60 AD 1B 09 D0
09C1:C9 39 F0 04 EE 1B 09 60 BB
09C9:A9 30 8D 1B 09 EE 1A 09 61
09D1:60 A5 01 09 03 85 01 58 B6
09D9:A9 15 85 FB A9 09 85 FC EF
09E1:A9 0F A2 08 A0 00 20 BA 61
09E9:FF A9 07 A6 FB A4 FC 20 3E
09F1:BD FF A9 00 A2 00 A0 E0 4F
09F9:20 D5 FF 78 18 A5 01 29 9B
0A01:FD 85 01 A0 00 8C 11 09 FC
0A09:AD 1F 40 C9 D0 90 A5 E2
0A11:01 09 03 85 01 58 4C FC 9F
0A19:0B AD 11 09 D0 03 8D 19 97
0A21:40 A0 00 AD 1C 40 85 FB 41
0A29:AD 1D 40 85 FC B1 FB 8D EF
0A31:F5 08 AD 1B 40 85 FC AD 69
0A39:1A 40 85 FB B1 FB CD F5 E9
0A41:08 D0 0B AD 11 09 F0 03 5B
0A49:20 9D 0A 4C 75 0A AD 11 1B
0A51:09 D0 14 AD 1C 40 8D 12 8A
0A59:09 AD 1D 40 8D 13 09 A9 79
0A61:AA 8D 11 09 4C 75 0A EE 1C
0A69:19 40 AD 19 40 C9 FF D0 5B
0A71:03 20 9D 0A AD 1D 40 C9 8F
0A79:3F D0 0A AD 1C 40 C9 3F 32
0A81:D0 03 4C F8 0A AD 1C 40 57
0A89:18 69 01 8D 1C 40 8D 1A 14
0A91:40 00 06 EE 1D 40 EE 1B 7C
0A99:40 4C 09 0A AD 1E 40 85 8E
0AA1:FB AD 1F 40 85 FC A0 00 68
0AA9:AD 12 09 91 FB C8 AD 13 C4
0AB1:09 91 FB C8 AD 19 40 91 9E
0AB9:FB 18 69 04 90 03 EE 1F CC
0AC1:40 18 6D 1E 40 8D 1E 40 40
0AC9:90 03 EE 1F 40 8D A5 FB 60
0AD1:69 03 85 FB 90 02 E6 FC 23
0AD9:AD 13 09 18 69 C0 85 FE 84
0AE1:AD 12 09 85 FD AC 19 40 DF
0AE9:B1 FD 91 FB 88 C0 FF D0 60
0AF1:F7 A0 00 8C 11 09 60 AD 03
0AF9:11 09 F0 03 20 9D 0A A0 5E
0B01:08 8C 1A 40 84 FB A9 00 E8
0B09:85 FD 8D 1C 40 A9 20 85 43
0B11:FE 8D 1D 40 A9 E0 8D 1B B8
0B19:40 85 FC A2 FF A0 3F 20 9B
0B21:4F 0B 20 D5 40 20 1C 41 FE
0B29:AD 1E 40 85 FB AD 1F 40 13
0B31:85 FC A0 00 98 91 FB C8 29
```

```
0B39:91 FB C8 91 FB AD 1E 40 5C
0B41:18 69 03 8D 1E 40 90 03 0D
0B49:EE 1F 40 4C 4A 09 8E F6 F5
0B51:08 8C F5 08 A0 00 B1 FB 32
0B59:91 FD A5 FC CD F6 08 D0 67
0B61:08 A5 FB CD F5 08 D0 01 B3
0B69:60 E6 FB D0 02 E6 FC E6 82
0B71:FD D0 E3 E6 FE 4C 57 0B 88
0B79:8E F6 08 8C F5 08 A0 00 6F
0B81:B1 FB 91 FD A5 FC CD F6 35
0B89:08 D0 08 A5 FB CD F5 08 3E
0B91:D0 01 60 C6 FB A5 FB C9 01
0B99:FF D0 02 C6 FC C6 FD A5 35
0BA1:FD C9 FF D0 DB C6 FE 4C 7A
0BA9:81 0B 93 0D 0D 0D 0D 2A
0BB1:20 20 75 68 2D 6F 68 21 2E
0BB9:20 74 48 45 20 50 52 4F 90
0BC1:43 45 53 53 20 48 41 53 62
0BC9:20 42 45 45 4E 20 41 42 35
0BD1:4F 52 54 45 44 D0 20 20 B9
0BD9:20 20 20 44 55 45 20 54 A4
0BE1:4F 20 4C 41 43 4B 20 4F 1C
0BE9:46 20 53 54 4F 52 41 47 68
0BF1:45 20 4D 45 4D 4F 52 59 56
0BF9:2E 0D 00 20 F5 40 A0 0B 69
0C01:A9 AD 4C 84 10 A9 00 8D 5F
0C09:14 09 AD 20 40 C9 FA F0 35
0C11:14 AD 1E 09 8D 1A 09 AD 87
0C19:1F 09 8D 1B 09 A9 FA 8D D8
0C21:20 40 4C 4A 09 4A 10 46
0C29:93 0E 0D 0D 0D 20 70 4C 17
0C31:41 43 45 20 54 48 45 20 D3
0C39:44 49 53 4B 20 54 4F 20 F5
0C41:42 45 20 57 52 49 54 54 F9
0C49:45 4E 20 54 4F 20 49 4E BC
0C51:20 54 48 45 0D 20 44 49 A6
0C59:53 4B 20 44 52 49 56 45 DF
0C61:2C 20 54 48 45 4E 20 45 8F
0C69:4E 54 45 52 20 54 48 45 B3
0C71:20 4D 4F 56 49 45 20 6E 4A
0C79:61 6D 65 2E 0D 0D 20 20 2A
0C81:20 70 4C 45 41 53 45 20 A5
0C89:4E 4F 54 45 20 54 48 41 9F
0C91:54 20 4F 43 43 55 52 52 60
0C99:45 4E 43 45 20 4F 46 20 8F
0CA1:54 48 45 0D 20 20 20 20 51
0CA9:20 25 20 53 59 4D 42 4F 28
0CB1:4C 20 41 42 4F 52 54 53 04
0CB9:20 54 48 49 53 20 53 45 9B
0CC1:4C 45 43 54 49 4F 4E 0D 30
0CC9:0D 00 24 30 00 00 00 00 EF
0CD1:00 00 00 00 00 00 00 00 E9
0CD9:00 00 00 00 00 00 00 00 F1
0CE1:20 AB FF 20 E7 FF 20 F5 6C
0CE9:40 A5 01 09 01 85 01 A9 06
0CF1:82 A0 0E 20 84 10 A9 00 EE
0CF9:8D 69 0E A9 00 8D 24 40 4E
0D01:A9 00 20 BD FF A9 0F A2 37
0D09:08 A0 0F 20 BA FF 20 C0 0A
0D11:FF A9 02 A0 0C A2 CB 20 82
0D19:BD FF A9 01 A2 08 A0 00 CD
0D21:20 BA FF 20 C0 FF A2 01 48
0D29:20 C6 FF 20 CF FF 20 CF 95
0D31:FF 20 CF FF 20 CF FF 20 AD
0D39:CF FF 8D 67 0E 20 CF FF F3
0D41:8D 68 0E A9 00 8D D3 40 B6
0D49:8D D4 40 AD 67 0E F0 03 9A
0D51:8D D3 40 AD 68 0E F0 03 6A
0D59:8D D4 40 AE D3 40 AD D4 32
0D61:40 20 CD BD A9 0D 20 D2 CD
```


0D69:FF	A9	91	20	D2	FF	A9	1D	29	0F99:4F	4E	20	67	45	4E	45	52	AD	11C9:20	20	20	73	20	46	4F	52	4A
0D71:20	D2	FF	20	D2	FF	20	D2	FB	0FA1:41	54	4F	52	0D	0D	9F	20	80	11D1:20	41	20	73	74	72	61	69	29
0D79:FF	20	CF	FF	8D	68	0E	EE	AE	0FA9:20	20	20	20	20	20	20	20	C7	11D9:67	68	74	20	72	75	6E	2D	C0
0D81:69	0E	A5	90	F8	03	4C	2C	E9	0FB1:20	20	20	20	63	4F	50	59	40	11E1:74	68	72	6F	75	67	68	0D	C4
0D89:0E	AD	68	0E	C9	22	D0	E9	66	0FB9:52	49	47	48	54	20	31	39	7F	11E9:20	20	20	20	20	20	20	4F	3B
0D91:A9	12	20	D2	FF	AD	24	40	75	0FC1:39	32	0D	20	20	20	20	20	8E	11F1:46	20	54	48	45	20	50	49	E2
0D99:F0	05	A9	92	20	D2	FF	AD	C5	0FC9:63	6F	6D	70	75	74	65	20	92	11F9:43	54	55	52	45	53	20	4F	A9
0DA1:68	0E	C9	22	D0	06	20	D2	80	0FD1:70	55	42	4C	49	43	41	54	B8	1201:52	20	43	48	4F	4F	53	45	E6
0DA9:FF	EE	24	40	20	CF	FF	8D	D5	0FD9:49	4F	4E	53	20	69	4E	54	07	1209:0D	20	6F	20	54	4F	20	6F	3B
0DB1:68	0E	C9	22	F0	09	AD	68	4E	0FE1:4C	20	6C	54	44	2E	0D	20	16	1211:73	63	69	6C	61	74	65	F2	
0DB9:0E	20	D2	FF	4C	AD	0D	AD	1E	0FE9:20	20	20	20	20	20	20	20	08	1219:20	42	41	43	4B	20	44	4F	EC
0DC1:68	0E	C9	22	D0	E6	20	D2	24	0FF1:20	61	4C	4C	20	72	49	47	6B	1221:57	4E	20	54	48	45	20	50	B
0DC9:FF	20	CF	FF	8D	68	0E	C9	D9	0FF9:48	54	53	20	72	45	53	45	52	1229:49	43	54	55	52	45	53	0D	FD
0DD1:20	F0	F6	A9	0D	20	D2	FF	40	1001:52	56	45	44	2E	0D	0D	0D	99	1231:00	A9	00	8D	20	D0	8D	21	19
0DD9:A9	91	20	D2	FF	A2	12	A9	B6	1009:05	20	20	70	6C	61	63	65	D3	1239:D0	A9	E0	8D	1B	40	A9	00	52
0DE1:1D	20	D2	FF	CA	D0	F8	A0	19	1011:20	74	68	65	20	64	69	73	9A	1241:8D	1A	40	A9	00	8D	1C	40	04
0DE9:00	98	AA	AD	68	0E	9D	CD	DE	1019:6B	20	6F	66	20	73	6C	69	5C	1249:A9	20	8D	1D	40	A0	00	8C	DE
0DF1:0C	20	CF	FF	8D	68	0E	F0	2F	1021:64	65	73	20	69	6E	20	74	F6	1251:20	40	20	9F	0E	A9	A5	A0	96
0DF9:04	C8	4C	EA	0D	A9	0D	20	C9	1029:68	65	20	64	69	73	6B	0D	1E	1259:11	20	84	10	20	E4	FF	F0	25
0E01:D2	FF	A9	91	20	D2	FF	A2	C3	1031:20	20	64	72	69	76	65	20	2D	1261:FB	C9	4F	D0	08	A9	FF	8D	61
0E09:16	A9	1D	20	D2	FF	CA	D0	3D	1039:61	6E	64															


```

13F9:9D A4 13 EE 25 40 20 D2 A6
1401:FF AE 25 40 E0 11 D0 D0 3B
1409:4C 1A 14 C9 0D D0 01 60 0B
1411:C9 14 D0 D4 AD 25 40 F0 FD
1419:BF CE 25 40 A9 20 AE 25 CD
1421:40 9D A4 13 A0 14 A9 2F 6E
1429:20 84 10 4C D9 13 9D 20 BF
1431:20 9D 9D 00 8D 24 40 18 1A
1439:C9 20 90 09 E9 5B B0 05 14
1441:AD 24 40 38 60 AD 24 40 17
1449:18 60 4C 26 40 20 06 07 17
1451:2D 20 62 52 55 43 45 20 EB
1459:6D 2E 20 62 4F 57 44 45 93
1461:4E 20 2D 00 00 00 00 00 5E
1469:00 00 00 00 00 00 00 00 91
1471:20 53 41 20 1C 41 AD 11 FA
1479:D0 29 20 D0 03 20 D5 40 E9
1481:AD 21 40 85 FB AD 22 40 44
1489:85 FC 18 A5 01 29 FE 85 41
1491:01 20 BB 40 A0 00 B1 FB 22
1499:D0 2C C8 B1 FB D0 27 C8 A3
14A1:B1 FB D0 22 20 BB 40 18 66
14A9:A5 FB 69 03 85 FB 90 02 40
14B1:E6 FC CD 1E 40 D0 0F A5 31
14B9:FC CD 1F 40 D0 08 18 A5 38
14C1:01 09 03 85 01 60 A0 00 30
14C9:B1 FB 85 FD C8 B1 FB 85 E4
14D1:FE C8 B1 FB 8D 19 40 18 0B
14D9:A5 FB 69 03 85 FB 90 02 70
14E1:E6 FC AC 19 40 B1 FB 91 36
14E9:FD 88 C0 FF D0 F7 18 EE D0
14F1:19 40 AD 19 40 D0 02 E6 2E
14F9:FC 65 FB 85 FB 90 02 E6 DE
1501:FC 4C 4A 40 EA AD 03 40 5E
1509:8D 23 40 AE 03 40 AC 03 2B
1511:40 88 D0 FD CA D0 F7 CE CF
1519:23 40 D0 EF 60 00 00 AD AE
1521:11 D0 09 20 09 10 8D 11 DF
1529:D0 AD 16 D0 18 29 DF 8D A9
1531:16 D0 AD 18 D0 18 29 F0 FB
1539:09 08 8D 18 D0 18 60 AD 72
1541:11 D0 18 29 DF 8D 11 D0 E5
1549:18 AD 18 D0 18 29 F0 09 4B
1551:06 8D 18 D0 18 AD 16 D0 66
1559:29 EF 8D 16 D0 A9 00 8D E1
1561:20 D0 8D 21 D0 60 AD 04 FA
1569:40 8D 20 D0 A2 04 86 FC 57
1571:A2 00 86 FB A0 00 AD 05 E2
1579:40 0A 0A 0A 0A 0D 04 40 F4
1581:91 FB C8 A6 FC E0 07 F0 61
1589:09 C0 00 D0 F3 E6 FC 4C F6
1591:36 41 8C D3 40 AE D3 40 9A
1599:E0 E8 D0 E4 60 A9 A7 85 55
15A1:FB A9 41 85 FC A9 00 85 C8
15A9:FD A9 20 85 FE A0 00 B1 C5
15B1:FB F0 0E AA C8 B1 FB 88 10
15B9:91 FD C8 CA D0 FA 4C 78 75
15C1:41 60 08 18 65 FD 85 FD 65
15C9:90 08 E6 FE A5 FE C9 40 08
15D1:B0 EF 18 A5 FB 69 02 85 BC
15D9:FB 90 02 E6 FC A5 FC CD 1B
15E1:22 40 D0 0A A5 FB CD 21 C1
15E9:40 D0 03 4C 77 41 4C 63 4A
15F1:41 00 00 00 00 00 00 00 BC

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PEGMAN

By Alain Tremblay

You're in a world that is filling with water. Dripping faucets are everywhere, and it's your job to plug them. Climb ladders to escape the rising flood and leap from ledge to ledge to reach the errant faucets.

Pegman, written in machine language, is a one-player game for the 64. To enter it, use *MLX*, our machine language entry program. See "Typing Aids" elsewhere in this section. When *MLX* prompts, respond with the following values.

Starting address: 0801
Ending address: 1B90

Be sure to save a copy of the program before exiting *MLX*.

How to Start

Pegman loads and runs like a BASIC program. Press the fire button to bring up the first screen after the game loads.

Your task is to plug all the dripping faucets on a given screen. There are ten screens in all (levels 0-9), and they can be played at random. The computer will make the choice, or you can play them in order one after the other. When you are asked if you want to start again after a game, move the joystick (plugged in port 2) left to select random play or right to select sequential play. You may also choose between a fast or slow flooding speed by moving the joystick up or down. Push the fire button when you are ready to play.

How to Play

Move the joystick right or left to run. To plug a dripping faucet, simply come in contact with it. Use the ladders by moving the joystick up or down to reach higher or lower floors. Simply push the fire button to jump up or push it while holding the joystick in the appropriate direction to jump either right or left. You can jump to grab a ladder or leap onto another floor. Don't worry about falling; you won't lose a life by falling down to a lower floor.

If you fall into the water, you can swim in all eight directions to reach any faucets that happen to be below the surface. Sounds change depend-

ing on whether you are above or below the surface. The only way to get out of the water is to use a ladder.

Dangers

Once a big fish becomes aware of your presence, he will try to devour you. If you are swimming on the surface, he may bear down on you or leap from the water to get you. You can deal him a fatal blow if you are under him when he falls back into the water. Push the fire button to thrust at him. The timing is critical.

The only other threats to your life are two crabs. You can brush against them, but don't run into them. The ladder-eating snails and the fish that someone keeps tossing at you are harmless, but they can impede your progress.

You earn 20 points for each faucet plugged. After completing a screen, you get points according to the level the flood has reached. You gain an extra life as a bonus for every 1000 points.

After completing the tenth screen on a sequential game, you may continue with random or sequential play and fast or slow flooding speed, just as you did at the start of the game.

PEGMAN

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0801:0B 08 0A 00 9E 32 30 36 2E
0809:32 00 00 00 00 20 A1 14 0A
0811:20 F5 0F 20 F1 12 20 1E C8
0819:10 A2 07 A9 00 95 80 BD 6A
0821:17 10 9D 12 D4 CA 10 F3 7B
0829:A9 32 85 81 20 9B 08 A2 85
0831:40 A9 00 9D D0 CF 95 30 C6
0839:CA 10 F6 8E 04 D0 AD 9B D4
0841:0F 29 10 0A A2 0D 69 08 E9
0849:CA E4 83 D0 F9 85 56 8A 92
0851:20 91 13 A5 83 09 30 8D C0
0859:AE 07 A9 CC 8D FB 07 E6 D5
0861:3A A9 C8 8D F9 07 A9 CE F8
0869:8D FC 07 8D FD 07 A9 D0 69
0871:85 55 A9 08 85 52 20 F7 FC
0879:13 A5 08 10 FC A6 81 E0 E4
0881:30 D0 56 A2 0A A0 0E 20 E1
0889:23 15 A2 00 BD CD 08 F0 EA
0891:88 20 D2 FF E8 D0 F5 20 DE
0899:51 0F 20 2F 0F 8A D0 01 52
08A1:60 A5 02 F0 19 10 08 A9 5D
08A9:52 A2 4E A0 44 D0 04 A9 76
08B1:20 AA A8 8D 7F 0F 8E 80 40
08B9:0F 8C 81 0F D0 D9 A5 03 D1
08C1:F0 D8 AD 9B 0F 49 15 8D 45
08C9:9B 0F D0 CB 53 54 41 52 03
08D1:54 20 41 47 41 49 4E 3F BB
08D9:00 A9 50 8D 00 D0 8D 01 96
08E1:D0 A2 00 86 5D 20 08 0F F5
08E9:A5 5D D0 8D 20 14 0E A5 2A

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08F1:44	F0 08 C6 3F 10 0A A9 C5	0B21:DF	A9 0F 85 39 CA F0 06 A8	0D51:D0	FA A9 08 85 59 85 5A 3F
08F9:03	85 3F 20 BA 09 20 18 29	0B29:CA	F0 24 4C C3 0B 06 39 B9	0D59:AD	F8 07 29 D0 09 03 8D 3A
0901:0B	A5 58 D0 E3 85 08 A6 06	0B31:AD	1B D4 D0 1A A5 08 29 2D	0D61:F8	07 C6 5A D0 08 AD F8 33
0909:08	D0 FC A9 01 20 9F 0F 64	0B39:03	D0 03 20 B4 0B A2 01 7F	0D69:07	29 D0 8D F8 07 A5 3B AE
0911:A9	F0 C6 55 A6 55 E0 33 E1	0B41:AD	12 D0 10 03 CA F0 05 F7	0D71:30	DA AD 01 D0 38 E9 0F 6A
0919:B0	EB A6 83 E8 AD 7F 0F 97	0B49:4A	90 02 A2 FF 86 3B A0 44	0D79:ED	07 D0 10 02 49 FF C9 66
0921:C9	20 F0 07 AE 1B D4 E0 1B	0B51:01	20 02 0B C5 5B AD FB D3	0D81:03	B0 C9 AD 00 D0 ED 06 82
0929:0A	B0 F9 86 83 E0 0A F0 B8	0B59:07	29 10 90 03 D0 03 6A 14	0D89:D0	10 02 49 FF C9 08 B0 CC
0931:03	4C 30 08 A0 0A 20 23 EE	0B61:D0	16 A2 FF AD 07 D0 38 1D	0D91:BB	A2 00 86 38 8E 07 D0 75
0939:15	A2 00 86 08 A5 08 10 DD	0B69:ED	01 D0 10 04 A2 01 49 C7	0D99:E8	A9 50 20 9F 0F A9 0F 3A
0941:FC	BD 58 09 F0 06 20 D2 8F	0B71:FF	C9 18 B0 03 86 3B C8 79	0DA1:85	53 A9 03 A0 02 A2 50 5B
0949:FF	E8 D0 F5 85 08 85 83 E9	0B79:84	38 A5 3B A2 07 F3 AD	0DA9:4C	6B 10 AD F8 07 29 0F E6
0951:A5	08 10 FC 4C 2D 08 47 78	0B81:0E	CA A5 3A 20 F3 0E 20 B6	0DB1:C9	02 D0 04 A9 81 85 50 3A
0959:45	54 20 52 45 41 44 59 5D	0B89:E7	0A 98 F0 03 20 B4 0B 45	0DB9:06	47 A5 5A D0 A4 8A F0 22
0961:20	54 4F 20 47 4F 20 4F 8B	0B91:A2	00 AD 07 D0 C9 CF 90 FC	0DC1:8C	E8 20 F1 0E A5 03 10 9C
0969:4E	21 00 A5 38 C9 02 90 C2	0B99:01	CA 69 08 C5 55 B0 06 7B	0DC9:14	20 45 0D D0 0F A5 46 C3
0971:47	20 02 0B AD FB 07 29 B4	0BA1:A5	38 4A 90 07 E8 8A F0 CC	0DD1:F0	1B CE 01 D0 CE 01 D0 A9
0979:10	85 0C A5 5B E9 08 18 7B	0BA9:02	86 3B 60 E6 38 A9 00 3B	0DD9:A9	C3 4C 71 0E A5 03 E8 50
0981:65	0C 38 E5 5C 10 02 49 1F	0BB1:85	3C 60 A5 3A 49 FE 85 7A	0DE1:20	F3 0E AD 01 D0 C9 D4 59
0989:FF	C9 04 B0 2B AD 01 D0 7C	0BB9:3A	AD FB 07 49 10 8D FB E9	0DE9:90	03 CE 01 D0 A5 02 05 1D
0991:E9	02 ED 07 D0 10 02 49 5B	0BC1:07	60 46 39 46 39 A5 3C 6E	0DF1:03	A8 AD F8 07 29 D1 A6 24
0999:FF	C9 05 B0 1B A9 71 85 B1	0BC9:38	E5 3B 85 3C 10 04 A2 02	0DF9:02	F0 08 30 04 29 C1 D0 6E
09A1:53	A9 02 85 5D A0 55 A2 1B	0BD1:01	86 3B 20 26 0F C4 3D A7	0E01:02	09 10 C0 00 F0 D3 49 23
09A9:55	20 6B 10 C6 81 A9 00 6C	0BD9:F0	0B 84 3D A2 07 A5 3B 47	0E09:01	A6 52 D0 63 A2 08 86 E2
09B1:85	08 8D 01 D0 4C EF 0F F0	0BE1:0A	0A 20 F3 0E C6 3E 10 DA	0E11:52	D0 5D A5 44 F0 03 4C C8
09B9:60	C6 41 10 4B A9 28 85 AD	0BE9:14	A9 05 85 3E A5 3A A2 0D	0E19:0C	0C C6 47 10 55 A9 14 C8
09C1:41	A2 0E B5 34 F0 39 20 32	0BF1:06	20 F3 0E 20 E7 0A 98 BF	0E21:85	47 20 2F 0F 20 45 0D 59
09C9:F3	0E BD 00 D0 29 07 D0 1B	0BF9:F0	03 20 B4 0B A6 3C E8 EC	0E29:B0	81 A5 45 F0 45 8A F0 A9
09D1:2F	BD 20 BD 18 75 34 9D 65	0C01:D0	08 A9 81 85 50 A9 01 92	0E31:4C	A4 A6 F0 A4 A5 03 D0 02
09D9:20	9D A8 9D 00 9D 85 D1 A7	0C09:85	38 60 C6 4C 10 63 A9 7D	0E39:69	A5 02 F0 39 A2 00 20 37
09E1:BD	10 9D 85 D2 B1 D1 C9 AD	0C11:0C	85 4C A5 48 38 E5 49 AC	0E41:F3	0E AD F8 07 C0 FF F0 4C
09E9:40	F0 0A C9 47 B0 06 B5 F4	0C19:85	48 10 04 A2 01 86 49 B7	0E49:25	A6 4E C6 4F 10 16 A9 68
09F1:34	49 FE 95 34 C4 5E D0 EB	0C21:20	26 0F C4 4A F0 0C 84 B3	0E51:03	85 4F E8 8A 29 03 AA 72
09F9:07	BD 30 9D C5 5F F0 D0 0A	0C29:4A	A5 49 0A 18 6D 01 D0 E2	0E59:85	4E A4 50 D0 07 4A B0 4D
0A01:CA	CA E0 0A D0 BD C6 43 38	0C31:8D	01 D0 C6 4D 10 0B A9 41	0E61:04	A9 02 85 50 BD 22 0F 4F
0A09:10	44 A9 0C 85 43 A2 0A B4	0C39:08	85 4D A5 4B A2 00 20 BF	0E69:A6	02 F0 04 10 02 49 10 E2
0A11:BD	01 D0 F0 33 DE 01 D0 55	0C41:F3	0E 20 74 0C A6 48 E8 96	0E71:8D	F8 07 4C 74 0C 98 30 6D
0A19:29	07 D0 2C BC 20 9D BD BF	0C49:F0	10 A5 49 30 24 A5 2F B3	0E79:FA	A9 C9 D0 F3 A4 46 D0 53
0A21:00	9D 38 E9 28 9D 00 9D 97	0C51:05	2D C9 20 F0 1C A5 D6 8C	0E81:04	A5 45 F0 EE A2 00 86 49
0A29:85	D1 BD 10 9D E9 00 9D 5F	0C59:30	18 A2 00 86 44 86 45 7B	0E89:48	CA 86 49 A9 C4 A6 02 91
0A31:10	9D 85 D2 B1 D1 C9 47 42	0C61:86	60 A9 46 C5 2D 90 04 76	0E91:86	4B D0 06 98 30 DC A9 27
0A39:F0	07 A9 00 9D 01 D0 F0 40	0C69:C5	2F B0 06 E8 86 45 4C DE	0E99:CA	E8 86 44 A0 00 84 46 BE
0A41:07	A9 20 91 D1 C8 91 D1 07	0C71:23	0D 60 A2 00 20 E7 0A EE	0EA1:F0	C6 98 30 04 A5 03 10 CA
0A49:CA	CA E0 06 D0 C2 C6 31 42	0C79:98	20 F3 0E A5 2F 85 FF 3A	0EA9:90	A6 2B E0 20 D0 07 A5 23
0A51:10	42 A9 06 85 31 A5 30 FF	0C81:AD	10 D0 4A AD 00 D0 AA EC	0EB1:03	10 03 4C 3A 0E A2 00 C7
0A59:30	3A D0 39 AD 12 D0 05 1E	0C89:6A	4A 4A A8 88 8A 29 04 02	0EB9:20	08 0F 20 91 14 26 02 F6
0A61:08	29 0F D0 2F A2 01 86 3F	0C91:D0	01 88 AD 01 D0 48 29 43	0EC1:69	0C 26 02 A6 2D E0 48 6E
0A69:37	AD 10 D0 29 04 D0 07 95	0C99:07	AA 68 4A 4A E0 05 D3	0EC9:18	F0 02 69 08 8D 00 D0 4C
0A71:AD	04 D0 C9 AA 90 02 A2 52	0CA1:E9	05 AA 20 23 15 A5 D6 D6	0ED1:B0	04 A5 02 F0 08 AD 10 2F
0A79:FF	86 36 A9 15 8D 05 D0 4A	0CA9:30	39 18 69 02 85 5F A2 49	0ED9:D0	09 01 8D 10 D0 A5 03 AB
0A81:AD	1B D4 29 03 85 34 49 40	0CB1:00	A4 D3 84 5E B1 D1 95 A8	0EE1:18	6D 01 D0 8D 01 D0 4A EE
0A89:03	AA E8 86 35 86 30 A9 1D	0CB9:2B	C9 49 F0 27 E8 E8 98 59	0EE9:90	89 AD F8 07 4C 6F 0E 4C
0A91:CD	8D FA 07 60 A2 05 D6 2E	0CCC:69	28 A8 E0 06 D0 EE A6 B3	0EF1:A5	02 18 7D 00 D0 9D 00 BA
0A99:2E	10 09 B5 30 95 2E B5 2F	0CC9:44	D0 18 A5 2D C9 47 B0 65	0EF9:D0	08 AD 10 D0 1D 12 9E
0AA1:32	20 F3 0E CA 8A 4A 90 DB	0CD1:3B	A9 00 85 46 A5 2F C9 3B	0F01:0F	D0 0A C9 FF D0 09 AD BB
0AA9:EE	E8 20 E7 0A 98 D0 2E 74	0CD9:20	F0 55 C5 FF F0 04 A9 BA	0F09:10	D0 3D 13 0F 8D 10 D0 DB
0AB1:AD	05 D0 C5 55 F0 07 E9 BA	0CE1:01	85 45 60 C6 58 8A 48 7F	0F11:60	01 FE 02 FD 04 FB 08 9F
0AB9:13	C5 55 B0 21 60 A2 81 CF	0CE9:98	48 A9 01 85 53 A9 02 74	0F19:F7	10 EF 20 DF 40 BF 80 37
0AC1:86	50 CA 86 34 A9 14 85 E4	0CF1:A2	55 A0 55 20 6B 10 A9 92	0F21:7F	C5 C6 C7 C6 A0 07 0A 96
0AC9:35	A5 38 D0 10 A5 08 29 46	0CF9:20	20 9F 0F 68 A8 68 AA 70	0F29:BD	03 88 D0 FA 60 A2 01 1E
0AD1:07	65 83 C9 07 90 06 A2 F8	0D01:A9	01 85 53 A9 20 91 D1 D8	0F31:AD	00 DC A0 00 94 02 4A 6C
0AD9:88	86 38 86 30 60 A9 00 99	0D09:95	2B D0 B1 A6 45 F0 D3 ED	0F39:B0	02 D6 02 4A B0 02 F6 3B
0AE1:85	30 8D 05 D0 60 A0 00 10	0D11:A2	FF C5 2F F0 0C A5 2F 5A	0F41:02	CA 10 EF 4A A5 59 B0 60
0AE9:AD	10 D0 3D 12 F0 F0 08 7D	0D19:C9	20 F0 06 A5 03 30 02 3A	0F49:04	10 01 E8 60 86 59 60 4C
0AF1:BD	00 D0 C9 50 90 09 88 FA	0D21:A2	01 E4 46 F0 BD 86 46 9F	0F51:A2	17 A0 00 20 23 15 B9 0C
0AF9:BD	00 D0 C9 0A B0 01 C8 81	0D29:10	B9 A9 C3 8D F8 07 60 E9	0F59:63	0F F0 41 20 D2 FF C8 34
0B01:60	AD 10 D0 4A AA AD 00 1A	0D31:20	45 0D B0 AA A9 00 85 DA	0F61:D0	F5 1C 20 53 43 4F 52 83
0B09:D0	6A 85 5B 8A 4A 4A E4	0D39:45	AD F8 07 29 10 09 C2 4F	0F69:45	3A 20 20 20 20 20 20 A0
0B11:AD	06 D0 6A 85 5C 60 A6 45	0D41:8D	F8 07 60 AD 01 D0 18 72	0F71:20	20 20 1F 4C 45 56 45 07
0B19:38	F0 E5 30 E3 C6 39 10 04	0D49:69	08 C5 55 60 20 45 0D 43	0F79:4C	3A 20 20 20 1E 52 4E BE

PROGRAMS

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0F81:44 0D 20 4C 49 56 45 53 4F 11B1:80 8D 12 D4 A9 3D 8D 1C 80 13E1:20 20 D2 FF C8 D0 02 E6 EE
0F89:3A 20 20 20 20 20 20 20 B4 11B9:D0 A9 0C 8D 21 D0 A9 18 C0 13E9:23 A5 D6 C9 17 90 B0 86 65
0F91:20 20 05 53 50 45 45 44 04 11C1:A6 55 A0 1E 4C D8 12 A9 16 13F1:57 86 58 4C 51 0F A9 00 4F
0F99:3A 28 53 29 00 AA 85 2A BB 11C9:35 8D 1C D0 A9 06 8D 21 1C 13F9:85 08 A2 0E 86 03 20 7F 1A
0FA1:86 28 A9 00 85 26 A9 9F F9 11D1:D0 A5 08 29 0F D0 3E AD 3F 1401:14 A5 08 30 17 A2 03 B1 9B
0FA9:85 24 A9 07 85 25 A0 05 40 11D9:FA 07 49 10 8D FA 07 AD 79 1409:D1 C9 40 D0 F1 C8 CA D0 BA
0FB1:F8 18 B9 7F 00 79 25 00 B1 11E1:15 D0 A6 30 10 2F 49 04 6E 1411:F6 20 4B 14 F6 34 CA CA 50
0FB9:99 7F 00 08 AA 29 0F 09 26 11E9:C6 30 30 26 AA A9 01 85 67 1419:E0 0A D0 E0 A9 00 85 08 BC
0FC1:30 91 24 88 8A 4A 4A 4A C5 11F1:38 AD 04 D0 8D 06 D0 AD FC 1421:A2 0A 86 03 20 7F 14 A5 EA
0FC9:4A 09 30 91 24 28 88 10 51 11F9:05 D0 8D 07 D0 20 DF 0A C5 1429:08 30 1E B1 D1 C9 47 D0 55
0FD1:E1 D8 C8 A9 30 D1 24 D0 AC 1201:AD 10 D0 29 F7 85 0C 29 C3 1431:F3 A6 D6 E8 20 21 15 B1 C7
0FD9:06 A9 20 91 24 D0 F3 A5 74 1209:04 0A 05 0C 8D 10 D0 8A EB 1439:D1 C9 47 F0 F4 20 1E 15 2E
0FE1:85 C5 82 F0 02 B0 07 E6 5B 1211:09 04 8D 15 D0 A5 08 A6 91 1441:20 4B 14 CA CA E0 06 D0 32
0FE9:81 18 69 10 85 85 A5 81 0C 1219:38 CA F0 02 29 03 29 07 F8 1449:D9 60 A6 03 A5 D3 9D 20 53
0FF1:8D C7 07 60 78 A9 33 85 06 1221:D0 08 AD FB 07 49 07 8D 1E 1451:9D A5 D1 9D 00 9D A5 D2 5A
0FF9:01 A2 00 BD 00 D0 9D 00 9B 1229:FB 07 A5 08 29 0F D0 11 7A 1459:9D 10 9D A5 D6 9D 30 9D 8D
1001:38 BD 00 D1 9D 00 39 BD E6 1231:A2 01 BD FE 07 29 01 09 76 1461:20 91 14 26 02 69 13 9D 5C
1009:40 1B 9D 00 3A CA D0 EB 4E 1239:BE 49 01 9D FE 07 CA 10 C2 1469:00 D0 26 02 A5 02 F0 03 C4
1011:A9 36 85 01 58 60 8F 88 40 1241:F1 A9 08 A0 1E A2 E2 4C 61 1471:20 FC 0E A5 D6 0A 0A 02
1019:89 00 F0 F4 6F 78 A9 10 2C 1249:D8 12 A9 00 8D 21 D0 AD D3 1479:69 28 9D 01 D0 60 AC 1B A0
1021:8D 15 03 A9 7F 8D 14 03 A5 1251:1E D0 4A 90 3F 4A 4A 85 48 1481:D4 C0 28 B0 F9 AD 12 D0 CF
1029:A9 7F 8D 0D DC A2 1E A9 D7 1259:0C 90 31 20 45 0D B0 2C BB 1489:29 0F 69 05 AA 4C 23 15 69
1031:00 9D 00 D4 BD 41 10 9D B6 1261:A5 60 D0 28 AD 01 D0 38 58 1491:A9 00 85 02 A5 D3 C9 28 97
1039:10 D0 CA D0 F2 86 07 58 14 1269:ED 05 D0 10 02 49 FF C9 DF 1499:90 02 E9 28 0A 0A 0A 60 37
1041:60 1B E2 00 00 FF 00 00 B4 1271:08 B0 19 A9 20 85 60 85 E0 14A1:A9 40 8D 88 02 20 B1 15 F1
1049:1E 01 01 00 05 00 00 01 1279:48 A9 FF 85 49 A5 36 85 57 14A9:20 94 15 10 03 4C 54 15 B1
1051:FC FC F3 FE 00 F1 F6 FB 4F 1281:4B A9 01 85 44 A9 04 85 84 14B1:20 A5 15 A2 02 86 08 0A 64
1059:F6 FF F3 F3 F3 F3 A4 AE 1289:50 20 31 D0 A5 0C 4A 90 57 14B9:2A A8 2A 29 03 85 03 98 C5
1061:51 D0 16 84 53 C8 A9 22 9C 1291:03 20 6C 09 A5 5D D0 35 D6 14C1:0A 2A 85 02 2A 29 03 85 CB
1069:A2 20 8D 0C D4 8E 0D D4 25 1299:20 45 0D B0 46 A5 44 D0 ED 14C9:04 A5 03 F0 44 4A F0 10 0A
1071:84 51 A9 11 8D 0B D4 A2 53 12A1:2C A5 46 30 28 A5 2F C9 11 14D1:90 04 A2 00 F0 0C A6 D6 73
1079:00 60 04 0F A0 03 A2 01 7A 12A9:20 F0 1F C9 47 B0 1B AD 7B 14D9:E8 20 21 15 A2 08 D0 02 CC
1081:8E 19 D0 CA E6 08 A5 58 F0 12B1:1F D0 4A A5 45 90 09 30 EB 14E1:A2 0E 86 05 A9 04 85 06 6E
1089:F0 74 A5 54 F0 1F 10 04 61 12B9:14 CE 01 D0 E6 45 D0 0D C3 14E9:20 32 15 20 1E 15 20 32 0B
1091:C6 54 30 19 AD 03 D0 69 46 12C1:10 02 A9 00 F0 02 A9 FF 86 14F1:15 A6 D6 E8 C8 20 23 15 D9
1099:03 8D 03 D0 C5 55 90 0D BD 12C9:85 45 EE 01 D0 A9 02 85 A6 14F9:C6 06 D0 EC A5 03 C9 03 BF
10A1:86 54 8E 03 D0 A2 02 20 51 12D1:07 A0 15 A9 08 A2 20 8D 77 1501:D0 03 20 1E 15 C6 04 10 16
10A9:08 0F 20 60 10 E6 09 A5 6F 12D9:16 D0 8E 12 D0 8C 18 D0 E9 1509:C0 A5 02 C6 08 D0 A8 F0 6F
10B1:09 C5 56 D0 49 86 09 A5 BB 12E1:4C 81 EA F0 E8 A5 08 29 10 1511:9F A5 04 F0 93 0A 65 D3 67
10B9:55 C9 40 90 02 C6 55 A5 83 12E9:07 D0 E2 CE 01 D0 D0 DD D9 1519:85 D3 4C 0A 15 A6 D6 CA E0
10C1:54 D0 3B A6 0A BD 80 9E F8 12F1:A9 D4 85 22 A9 15 85 23 C2 1521:A4 D3 BD 00 9C 85 D1 BD A6
10C9:85 0B BD C0 9E 85 0C BC 13 12F9:A9 2F 8D 1C 13 A2 00 A0 F5 1529:20 9C 85 D2 86 D6 84 D3 D4
10D1:40 9E B1 00 C9 20 F0 1D 6E 1301:00 A9 01 85 FF B1 22 C8 DD 1531:60 A6 05 BD 3E 15 A4 D3 15
10D9:BD 80 9F C5 55 B0 16 8D 70 1309:D0 02 E6 23 C9 F9 D0 09 08 1539:91 D1 E6 05 60 46 43 45 B5
10E1:03 D0 BD 00 9F 8D 02 D0 77 1311:B1 22 85 FF F0 12 C8 A9 54 1541:42 44 41 20 40 44 41 45 A2
10E9:BD C0 9F 0D 10 D0 8D 10 CC 1319:00 9D 80 2F E8 D0 03 EE 29 1549:42 46 43 20 40 20 40 15
10F1:D0 A9 90 85 54 E8 E4 57 B6 1321:1C 13 C6 FF D0 F3 F0 D9 05 1551:20 40 20 20 94 15 30 1D 18
10F9:90 02 A2 00 86 0A A6 07 E7 1329:A9 10 85 05 A9 C0 85 26 AA 1559:20 A5 15 85 02 A9 47 20 5D
1101:D0 03 4C 4B 12 CA 86 07 5A 1331:A9 2F 85 23 A5 26 18 69 3A 1561:37 15 C8 A9 48 20 39 15 6A
1109:D0 03 4C 08 11 A6 51 F0 21 1339:40 85 26 85 22 85 24 A5 13 1569:88 A6 D6 E8 20 23 15 C6 69
1111:37 CA D0 0E A6 53 BD 7B F5 1341:23 69 00 85 23 09 04 85 76 1571:02 D0 EA F0 DE 20 94 15 F2
1119:10 E8 86 53 E0 04 F0 1C 98 1349:25 E6 24 E6 24 A0 00 A9 FB 1579:30 08 A9 49 20 37 15 4C DB
1121:D0 23 A5 08 4A 90 21 A5 26 1351:15 85 04 A9 03 85 03 B1 64 1581:76 15 E8 30 08 AD 88 02 56
1129:53 E8 30 0C 06 53 90 15 A9 1359:22 85 06 A9 01 85 02 4A B9 1589:69 04 4C A3 14 A9 04 8D 0A
1131:A9 80 85 53 85 51 D0 0D 4E 1361:06 06 90 02 05 02 06 02 7C 1591:88 02 60 20 A5 15 18 AA EA
1139:46 53 90 09 A2 10 8E 0B 73 1369:90 F6 AA 29 A4 0A 85 02 09 1599:30 09 20 A5 15 A8 20 23 2B
1141:D4 A2 00 86 51 8D 08 D4 84 1371:8A 29 55 0A 05 02 91 24 E9 15A1:15 A9 00 60 AD F8 18 EE 37
1149:A6 50 F0 46 30 1B 8A 4A A2 1379:E6 22 C6 24 C6 03 D0 D7 72 15A9:A6 15 D0 03 EE A7 15 60 57
1151:B0 1F 4A B0 0A 85 50 A9 98 1381:A5 24 18 69 06 85 24 C6 72 15B1:A9 93 20 D2 FF A2 00 A5 F6
1159:25 A2 00 A0 27 D0 25 C6 4E 1389:04 D0 C8 C6 05 D0 A5 60 82 15B9:D1 A4 D2 9D 00 9C 18 69 36
1161:50 A9 07 A2 11 A0 10 D0 1D 1391:0A 0A 69 40 85 23 20 B1 1B 15C1:28 48 98 9D 20 9C 68 90 D3
1169:1B CA 30 10 A9 70 8D 01 FD 1399:15 A0 00 84 22 A2 00 B1 08 15C9:00 C8 E8 E0 1A D0 EC 60 20
1171:D4 A9 00 85 50 A9 80 8D 78 13A1:22 C9 49 90 31 A5 D1 9D DE 15D1:00 00 00 2C 01 8C 6E 03 D8
1179:04 D4 D0 16 86 50 A9 30 47 13A9:80 9E A5 D2 9D C0 9E A5 6C 15D9:8E F7 9B 1E EE 67 8E EF C0
1181:A2 00 A0 09 8E 05 D4 8C 58 13B1:D3 9D 40 9E 20 91 14 26 B0 15E1:FF 9C 7C 89 F8 38 50 70 15
1189:06 D4 8D 01 D4 A9 81 8D 83 13B9:02 69 19 9D 00 9F A5 02 04 15E9:18 F8 E0 1F FF E0 2B FE 45
1191:04 D4 A6 52 F0 1E E0 08 AE 13C1:90 01 2A 0A 9D C0 9F A5 2B 15F1:D0 28 70 28 28 00 28 F9 AA
1199:D0 11 A9 81 8D 12 D4 A2 B6 13C9:D6 0A 0A 69 37 9D 80 A3 15F9:1C 2C 01 B0 6E 03 B8 F6 50
11A1:14 20 45 0D D0 02 A2 A0 C3 13D1:9F E8 A9 00 F0 02 A9 E0 28 1601:CF 78 EF 33 B8 EF FF B8 A2
11A9:8E 0F D4 C6 52 D0 05 A9 67 13D9:8D 86 02 B1 22 29 4F 09 21 1609:7C 89 F0 18 50 E0 18 F8 A4

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1611:C0 2F FF C0 53 FE A0 90 DD
1619:70 A0 A0 00 A0 F9 2C 01 FF
1621:00 00 05 4A 30 05 5A 7F 5C
1629:08 5A 4F F5 55 03 F5 55 31
1631:00 3D 04 00 FC 04 03 F0 1C
1639:08 0F 00 00 1C 00 00 10 1E
1641:F9 1D 16 00 00 50 00 00 B5
1649:5A 00 00 5A 00 01 5A 00 01
1651:35 50 00 F5 40 0F FD 40 06
1659:7F FD 00 70 08 00 40 F9 86
1661:16 80 00 00 80 00 02 40 01
1669:00 02 40 00 01 4A 00 01 50
1671:5A 00 01 5A 00 00 5A 00 45
1679:00 54 00 00 54 00 00 14 71
1681:00 00 14 00 00 14 00 00 80
1689:3F C0 00 3F C0 00 0F C0 5E
1691:00 0F C0 00 03 00 00 07 B8
1699:00 00 01 F9 0A 80 00 00 D7
16A1:40 00 28 40 00 28 40 00 18
16A9:29 40 00 29 00 00 15 00 37
16B1:00 54 00 00 54 00 00 54 E9
16B9:00 02 57 00 00 17 00 00 AD
16C1:3F C0 00 FF C0 00 F0 40 E5
16C9:00 C0 00 00 C0 00 00 C0 EC
16D1:00 00 C0 00 00 40 F9 0F 1A
16D9:0A 00 00 0A 00 00 0A 00 C1
16E1:00 0A 06 00 55 14 01 55 A3
16E9:50 05 15 40 04 14 00 20 B6
16F1:50 00 00 F0 00 00 FC 00 4F
16F9:03 FF 00 0F 0F 00 3C 3C C5
1701:00 30 10 00 40 F9 10 0A 51
1709:00 00 0A 00 00 0A 00 00 A0
1711:0A 00 00 14 00 00 55 00 30
1719:01 55 00 01 14 60 02 14 67
1721:60 02 50 00 00 F0 00 00 CD
1729:F0 00 03 FC 00 03 0C 00 24
1731:04 0C 00 00 0C 00 00 04 C8
1739:F9 0F 0A 00 00 0A 00 00 91
1741:0A 00 00 0A 00 00 14 00 3D
1749:00 55 00 00 55 00 00 55 CC
1751:80 00 55 80 00 18 00 00 D2
1759:3C 00 00 3C 00 00 3C 00 E1
1761:00 3C 00 00 70 00 00 30 52
1769:00 00 10 F9 0F 0A 00 00 D9
1771:0A 00 00 0A 00 00 0A 00 59
1779:00 14 00 00 54 00 01 54 A5
1781:80 01 15 40 02 15 00 00 B5
1789:50 00 00 F0 00 00 FC 00 E8
1791:03 CC 00 1F 0C 00 00 03 C9
1799:00 00 03 00 00 01 F9 05 25
17A1:04 00 00 04 00 00 0C 00 2A
17A9:00 0C 00 00 1E 00 00 1E E9
17B1:00 00 1E 00 00 0C F9 34 FB
17B9:28 00 00 28 00 00 28 00 CE
17C1:00 28 00 00 14 00 00 55 EF
17C9:00 01 55 40 01 14 40 00 BF
17D1:55 00 00 96 00 00 3C 00 8C
17D9:00 3C 00 00 3C 00 00 3C 35
17E1:00 00 3C 00 00 3C 00 00 88
17E9:14 F9 0E 08 28 20 04 28 D4
17F1:10 05 28 50 01 69 40 00 A1
17F9:55 00 00 14 00 00 14 00 3C
1801:00 14 00 00 14 00 00 14 EA
1809:00 00 3C 00 00 FF 00 00 C0
1811:C3 00 03 00 0C 03 00 C0 56
1819:04 00 10 F9 0D 80 20 00 97
1821:80 28 00 A0 2A A0 A0 0B C5
1829:E8 A0 2B 68 A8 AB EA 2A D5
1831:AA AA 2A AA 96 2A AA 41 45
1839:2A AA 00 A0 AA 00 A0 AA 74

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1841:41 80 2A 96 80 2A AA 00 E2
1849:AA A8 00 A0 00 00 80 F9 FD
1851:12 20 00 80 2A A0 80 2B 9A
1859:E8 80 2B 68 A0 AB EA A0 34
1861:AA AA 2A AA AA 2A AA AA 7F
1869:2A AA A9 2A AA AA AA AA 31
1871:AA A0 AA AA A0 2A A8 80 9E
1879:2A A0 80 A0 00 00 A0 00 42
1881:00 80 F9 0C A0 00 02 B8 93
1889:00 02 BA 00 02 AA 40 02 CE
1891:AA 90 00 A6 80 01 A5 00 F8
1899:00 29 00 00 28 00 00 A8 FD
18A1:00 00 A0 00 15 A0 00 05 16
18A9:40 00 01 40 00 01 40 00 A2
18B1:00 40 00 00 40 F9 0A 10 FF
18B9:00 05 44 00 10 43 00 30 71
18C1:50 00 00 50 00 3D 50 00 B4
18C9:2D 54 00 EF 54 00 EB D4 F3
18D1:00 FA F4 00 BE BC 03 AF FD
18D9:AC 03 EB EF 02 FE FB 0F B0
18E1:AF B0 3B EB B0 3E FB 50 03
18E9:2F B1 50 3B 01 40 00 01 E5
18F1:F9 05 F9 00 00 00 00 0A A9
18F9:00 D1 91 D1 90 15 03 77 44
1901:00 03 11 70 0E 03 60 0F 69
1909:18 60 FF 02 14 13 07 08 82
1911:07 0F 1D 05 FF 05 05 0B A7
1919:0C 10 10 14 20 05 23 0C FF
1921:17 02 19 13 03 FF 0A 01 E0
1929:E0 04 10 60 12 02 E0 0C 3B
1931:10 F0 14 18 E0 FF 06 20 DE
1939:0C 07 07 0B 03 16 12 FF 59
1941:04 07 09 11 0F 11 04 22 50
1949:01 0D 01 19 13 05 0D 01 B8
1951:0C 24 0E 1C FF 03 03 40 68
1959:03 0D 40 03 17 40 03 21 69
1961:40 08 05 92 42 D0 11 03 F9
1969:63 60 FF 02 08 06 03 18 FB
1971:05 08 10 08 01 26 14 11 84
1979:01 04 01 13 01 FF 06 04 96
1981:01 03 14 20 01 1D 06 13 15
1989:0D 03 0F 24 05 22 0C 1D 0D
1991:FF 02 04 A3 E0 08 01 53 7B
1999:53 50 0D 0F 50 11 01 50 35
19A1:11 1D 50 FF 07 05 0D 01 15
19A9:12 12 07 20 0D 0C 0B 01 FB
19B1:08 1A 01 FF 0A 0A 01 01 0A
19B9:01 06 02 0E 01 18 02 25 A0
19C1:0C 03 0F 26 11 0D 0C 1E F1
19C9:FF 07 10 40 FF 06 08 01 EC
19D1:0C 0E 01 0E 0F 01 05 13 28
19D9:01 0E 03 01 10 20 02 04 89
19E1:0A 01 0E 13 05 0C 1A 01 D9
19E9:05 21 07 0C 17 02 08 03 5C
19F1:01 0D 04 01 0A 19 01 08 37
19F9:17 01 06 1A 01 09 1C 01 BF
1A01:05 17 01 FF 0D 01 08 0C 26
1A09:07 0E 15 1C 08 1F 0C 14 91
1A11:FF 04 01 C0 06 01 83 42 EF
1A19:A0 0A 01 C2 40 0B 01 83 20
1A21:41 90 0F 01 C2 40 01 05 2A
1A29:B0 04 16 D0 03 11 D0 FF 84
1A31:0A 1F 0A 0C 07 03 0E 0E A2
1A39:05 05 05 01 FF 06 0A 0F 1D
1A41:05 07 20 08 24 03 14 01 94
1A49:03 0A 12 01 21 FF 03 05 E7
1A51:61 70 08 01 BA 00 07 20 67
1A59:40 0B 1E 40 FF 04 01 01 4B
1A61:05 05 01 06 09 01 07 0D 41
1A69:01 08 11 01 09 15 01 0B FB

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1A71:19 01 10 1F 01 FF 01 01 71
1A79:14 05 01 07 01 11 08 00 E5
1A81:0A 10 08 20 05 22 04 10 8A
1A89:FF 06 01 A0 0D 16 A0 10 7B
1A91:01 E0 09 16 E0 03 04 76 92
1A99:00 0B 00 60 0B 17 60 FF 0C
1AA1:08 0E 05 08 13 05 03 01 32
1AA9:01 03 23 01 FF 01 14 05 C4
1AB1:10 0C 03 07 00 08 1F 0C 2C
1AB9:21 FF 03 12 40 05 0E 42 74
1AC1:40 07 0A 40 07 1A 40 09 47
1AC9:06 40 09 1E 40 0A 01 B3 F3
1AD1:F0 FF 0A 13 05 0D 05 05 5C
1AD9:0D 20 05 FF 04 0F 14 13 D4
1AE1:01 1A 05 23 06 1D 08 0D B1
1AE9:06 0D 08 1A FF 08 08 C8 FF
1AF1:00 09 08 8C 00 08 18 C8 4B
1AF9:00 09 18 8C 00 05 0C 9D 06
1B01:00 10 0C D9 00 12 06 A2 51
1B09:E0 FF 05 13 04 05 04 01 BE
1B11:02 02 01 03 07 01 02 0B 64
1B19:01 01 06 01 01 10 01 01 2C
1B21:15 01 01 1A 01 02 1E 01 31
1B29:04 21 01 FF 01 01 01 09 E0
1B31:01 12 09 0B 09 1B 01 19 0E
1B39:02 20 04 1F FE 00 00 00 E2
1B41:FF 55 95 A6 95 55 FF 00 EB
1B49:00 00 FF 55 65 A9 65 00 71
1B51:00 00 00 00 FF 55 59 00 8F
1B59:00 00 00 00 00 00 FF 55 E4
1B61:FF 00 00 00 00 00 00 6A 02
1B69:59 55 FF 00 00 00 00 55 F6
1B71:95 A6 95 55 FF 00 00 40 64
1B79:40 55 40 40 55 40 01 0A
1B81:01 55 01 01 01 55 01 7E 9B
1B89:18 FC FE 06 06 0F 00 00 B7

```

Alain Tremblay lives in Sainte-Foy, Québec, Canada.

BUG-SWATTER

Please let us know whenever you encounter a problem with any of the programs printed in the Gazette section of *COMPUTE*. Every program is thoroughly checked before it's printed, but occasional problems still occur. Often it's a reader who first spots an error and lets us know. Here are corrections to a couple of our recent program listings.

Padlock

The machine language listing for *Padlock* (January 1992) was not complete. One column of data was omitted. In order to add the missing code, load and run *MLX* and respond with *Padlock*'s original starting and ending addresses, 0801 and 0ED0, respectively. Then select Load File from the *MLX* menu and load your copy of *Padlock*.

When the *MLX* menu returns, select Enter Data. When prompted for a starting address, give the address listed be-

low; then type in the remaining lines of code. When all of the data has been entered, save the program with a new name before exiting *MLX*.

Starting address: 0C51

PADLOCK

```
0C21:4F CD E6 FA D0 02 E6 FB 39
0C29:CA D0 DD F0 D9 20 29 CE 16
0C31:20 42 F1 F0 FB 20 EF CD 45
0C39:A6 FC BD A1 05 20 A8 CE 7E
0C41:9D EF CF CA D0 F4 A5 FC 6D
0C49:A2 F0 A0 CF 20 F9 FD A2 87
0C51:08 20 00 FE A9 01 85 C1 83
0C59:A9 08 85 C2 20 B6 CE E6 85
0C61:AE D0 02 E6 AF 20 EA F5 7D
0C69:A5 90 F0 06 20 BE CD 4C DA
0C71:9D CE 20 78 CE 20 FA CD 52
0C79:B0 03 4C 5D CB A9 0E 8D B8
0C81:20 D0 A9 06 8D 21 D0 A2 A8
0C89:20 BD 73 CF 20 16 E7 CA 80
0C91:D0 F7 A9 47 8D 18 03 A9 36
0C99:37 85 01 60 A9 03 85 D3 0D
0CA1:20 22 CE 20 8E CE A9 08 39
0CA9:20 09 ED A9 6F 20 C7 ED E5
0CB1:A9 00 20 16 E7 20 13 EE D8
0CB9:C9 0D D0 F6 20 EF ED 20 40
0CC1:8E CE A9 64 85 A2 A5 A2 F4
0CC9:D0 FC 4C EF CD A9 20 A2 0A
0CD1:27 9D 48 07 CA 10 FA 60 4B
0CD9:20 42 F1 C9 59 D0 02 18 97
0CE1:60 C9 4E D0 F3 20 EF CD 41
0CE9:38 60 A9 0A 85 D3 20 22 E9
0CF1:CE 20 8E CE A2 12 BD 94 A5
0CF9:CF 20 16 E7 CA 10 F7 60 2A
0D01:A9 15 85 D6 4C 6C E5 A9 DC
0D09:08 85 D3 20 22 CE 20 8E 20
0D11:CE A2 17 BD A8 CF 20 16 D4
0D19:E7 CA 10 F7 60 A6 FB 20 11
0D21:0E F2 20 3E F1 8D D5 08 60
0D29:0D 93 09 20 3E F1 8D D9 C0
0D31:08 8D 99 09 A5 FB 20 91 65
0D39:F2 A9 00 85 B9 4C 33 F3 E8
0D41:A9 09 85 D3 20 22 CE 20 A7
0D49:8E CE A2 13 BD C1 CF 20 98
0D51:16 E7 CA 10 F7 60 A9 07 66
0D59:85 D3 20 22 CE 20 8E CE 34
0D61:A2 18 BD D6 CF 20 16 E7 0B
0D69:CA 10 F7 60 A9 1C 20 16 06
0D71:E7 A9 12 20 16 E7 A9 20 F1
0D79:4C 16 E7 A5 B8 20 91 F2 F2
0D81:20 33 F3 4C 5D CB C9 20 89
0D89:90 07 C9 60 09 20 90 03 D9
0D91:18 69 40 60 A5 AE 8D A8 CB
0D99:08 8D 30 09 A5 AF 8D AE 67
0DA1:08 8D 36 09 A5 4B 8D 5B 4B
0DA9:09 A5 4C 8D 5C 09 A5 26 8C
0DB1:8D 57 09 60 0D 12 0A 0B 5F
0DB9:10 11 11 05 03 15 05 2A 33
0DC1:2A 2A 20 D3 45 43 55 52 F0
0DC9:49 54 59 20 D3 59 53 54 C9
0DD1:45 4D 20 2A 2A 11 11 B5
0DD9:11 11 00 0D D3 4F 55 52 6A
0DE1:43 45 3A 11 20 A3 A3 A3 C1
0DE9:A3 A3 A3 A3 A3 A3 A3 04
0DF1:A3 A3 A3 A3 A3 00 0D C4 71
0DF9:45 53 54 49 4E 41 54 49 14
```

```
0E01:4F 4E 3A 11 20 A3 A3 A3 2B
0E09:A3 A3 A3 A3 A3 A3 A3 25
0E11:A3 A3 A3 A3 A3 00 0D D3 A1
0E19:59 53 20 24 11 A3 A3 A3 FE
0E21:A3 00 0D 24 30 30 31 C6
0E29:11 20 A3 A3 00 0D C3 4F 8F
0E31:44 45 20 57 4F 52 44 3A C0
0E39:11 20 A3 A3 A3 A3 A3 A3 2B
0E41:A3 A3 A3 A3 A3 A3 A3 5D
0E49:A3 A3 A3 A3 A3 A3 9E 00 B7
0E51:FF 11 11 21 44 52 4F 57 47
0E59:20 45 44 4F 43 20 52 55 E8
0E61:4F 59 20 54 45 47 52 4F FF
0E69:46 20 54 27 4E 4F C4 93 7A
0E71:9A 00 20 4B 53 49 44 20 FB
0E79:45 43 52 55 4F 53 20 54 05
0E81:52 45 53 4E 49 00 20 4B 3D
0E89:53 49 44 20 4E 4F 49 54 C2
0E91:41 4E 49 54 53 45 44 20 A8
0E99:54 52 45 53 4E 49 00 20 0A
0EA1:29 4E 2F 59 28 20 3F 45 E6
0EA9:52 55 53 20 55 4F 59 20 6B
0EB1:45 52 C1 00 20 29 4E 2F AE
0EB9:59 28 20 3F 45 4C 49 46 B8
0EC1:20 52 45 48 54 4F 4E 41 6D
0EC9:20 45 44 4F C3 00 00 00 E2
```

Janus

There are two misprints in the *Janus* program listing (December 1991). In lines 680 and 690, replace each of the { 1 } figures with a comma. □

TYPING AIDS

MLX, our machine language entry program for the 64 and 128, and *The Automatic Proofreader* are utilities that help you type in Gazette programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each *Gazette Disk* and are printed in all issues of *Gazette* through June 1990.

If you don't have access to a back issue or to one of our disks, write to us, and we'll send you free copies of both of these handy programs. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope.

Write to Typing Aids, *COMPUTE's Gazette*, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

Gazette is looking for utilities, games, applications, educational programs, and tutorial articles. If you've created a program that you think other readers might enjoy or find useful, send it on disk to

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COMPUTE Publications
324 W. Wendover Ave.
Ste. 200
Greensboro, NC 27408

Please enclose an SASE if you wish to have the materials returned.

ONLY ON DISK

In addition to the type-in programs found in the magazine, here's the bonus program found on this month's *Gazette Disk*.

Color Isolation Tool

By Bruce M. Bowden
Greensboro, NC

Have you ever needed to pick a multi-color image apart? Perhaps certain colors define a specific part of an image which you'd like to isolate from the rest, perhaps for importing into another image. VIC multicolor graphics offer no convenient way of doing this. *Color Isolation Tool* gives you that power.

Color Isolation Tool will also give you exceptional power for manipulating the actual color content of multicolor Commodore 40-column graphics images. Each color in an image can be separated and viewed, printed, or saved to disk. When you use this program with a flexible graphics-manipulation program, such as Bowden's *Graphic Assault System (GAS)*, you'll have total control over all your graphic images. *Color Isolation Tool* supports Koala, Doodle, GAS compressed/tagged format, and 8K bitmap images.

Gazette Gallery

Picture of the Month

"The UFO"

By Jack Modjallal
Encino, CA

"Sword" and "Lissa"

By Dotan Haim
Askelon, Israel

"Golden Age SF"

By Vince Zahnle
Mt. Holly, NJ

Order this disk for \$9.95 plus \$2.00 shipping and handling from Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.